STUDIA ARTISTARUM
Etudes sur la Faculté des arts
dans
les Universités médiévales

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*J. M. M. H. Thijssen*
*and H. A. G. Braakhuis*

# The Commentary Tradition on Aristotle's *De generatione et corruptione*

## Ancient, Medieval and Early Modern

BREPOLS

# Studia Artistarum

## Studies on the Faculty of Arts at the Medieval Universities

In this book, a dozen distinguished scholars in the field of the history of philosophy and science investigate aspects of the commentary tradition on Aristotle's *De generatione et corruptione*, one of the least studied among Aristotle's treatises in natural philosophy. Many famous thinkers such as Johannes Philoponus, Albert the Great, Thomas Aquinas, John Buridan, Nicole Oresme, Francesco Piccolomini, Jacopo Zabarella, and Galileo Galilei wrote commentaries on it. The distinctive feature of the present book is that it approaches this commentary tradition as a coherent whole, thereby ignoring the usual historiographical distinctions between the Middle Ages, the Renaissance, and the seventeenth century.

Frans de Haas and Henk Kubbinga address the Greek commentary tradition on *De generatione et corruptione*. Simone van Riet's essay is devoted to the Latin version of Avicenna's third treatise of his *Kitab al Shifa*, which discusses Aristotle's *De generatione et corruptione*. James Otte traces the intricate history of the identification of the Latin translator of Aristotle's treatise as Burgund of Pisa. The essay by John Murdoch explores the *fortuna* of atomistic arguments in the Latin commentary tradition. Jürgen Sarnowsky, Henk Braakhuis, and Stefano Caroti examine various themes in the commentaries that were produced by the so-called Buridan School, that is, John Buridan, Albert of Saxony, Nicholas Oresme, and Marsilius of Inghen. The article by Silvia Donati focuses on the influential commentary by the *Expositor*, Giles of Rome. The final essay, written by Anita Guerrini, tackles Robert Boyle's attitude in *The Origin of Forms and Qualities* toward such Aristotelian key concepts as forms, matter, qualities, and mixture. These essays are prefaced by a preliminary survey by Hans Thijssen of Aristotle's text, its Latin translations and its Greek, Arabic and Latin commentaries.

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*Études sur la Faculté des arts dans les Universités médiévales*

*Sous la direction de*

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*This volume is dedicated to*
*the memory of Simone van Riet*

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*The editors further wish to express their gratitude to Charles Burnett, Stefano Caroti, Frans de Haas, Ian Hunter, and Christoph Lüthy for their advice on particular sections of this book.*

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*The Editors*

# The Commentary Tradition on Aristotle's *De generatione et corruptione. An Introductory Survey*

*Johannes M. M. H. Thijssen*

When discussing the medieval curriculum in natural philosophy, James Weisheipl once observed that "few bothered to deal with ... *De generatione et corruptione*."[1] This observation, however, seems to reflect the current low interest in this work rather than the activities of past commentators. For many ancient, medieval and Renaissance authors wrote commentaries on the *De generatione et corruptione*, among them famous thinkers such as John Philoponus, Albert the Great, Thomas Aquinas, John Buridan, Nicole Oresme, Biagio de Parma, Paulus Venetus, Pietro Pomponazzi, Francescus Toletus, the Coimbra commentators, Francesco Piccolomini, Jacopo Zabarella, Caesar Cremonini, and Galileo Galilei.[2] By contrast, *De generatione et corruptione* remains today probably one of the least studied among Aristotle's treatises in natural philosophy, a disreputable position which it shares with the commentary literature dedicated to it.[3] The present article cannot remedy this deficiency. All that it can do is to recall some well-known and lesser-known facts about the transmission and study of Aristotle's *De generatione et corruptione* in the West and to provide a few suggestions for further research.

1. Weisheipl, "The Interpretation of Aristotle's *Physics*," p. 523. More recently, during a plenary discussion at a conference devoted to the curriculum of the arts faculty at Paris, Louis Jacques Bataillon observed: "je voudrais plaider pour des mal-aimés [dans les textes d'Aristote]. En premier lieu, le *De generatione et corruptione* et le [quatrième] livre des *Météores*." His observation originated from the fact that the conference virtually ignored discussing the place of the *De generatione et corruptione* in the curriculum. See Weijers e.a. (eds.), *L'enseignement des disciplines*, p. 329.
2. A survey of the commentaries is provided by Charles Lohr in his *Medieval Latin Aristotle Commentaries*, and his *Latin Aristotle Commentaries, vol. II. Renaissance Authors*. An updated chronological list of commentators on *De generatione et corruptione*, which prof. Lohr has kindly put at my disposal, shows some interesting patterns. During the thirteenth, fourteenth, and fifteenth centuries, approximately fifteen authors per century wrote one or several commentaries on *De generatione et corruptione*. During the sixteenth and seventeenth centuries, this figure dramatically rose to about a hundred commentators. For Galileo's questions on Aristotle's *De generatione et corruptione*, see Wallace, *Galileo's Early Notebooks*, esp. pp. 159-253.
3. Interestingly, the 1999 Symposium Aristotelicum is devoted to Book 1 of Aristotle's *De generatione et corruptione*. Its proceedings will be edited by Jaap Mansfeld and will be published at Oxford University Press.

Like other Aristotelian works, *De generatione et corruptione* only received its present form at some point in the first century BC with the edition of Andronicus of Rhodes.[4] In the older literature, much has been made of Andronicus' activities as the editor or even creator of the Aristotelian corpus of texts, but Jonathan Barnes has recently urged us to be more cautious. On the basis of a new examination of all the relevant ancient sources Barnes concludes that Andronicus' arrangement of Aristotle's lecture notes and of the reports of his lectures are not of the same order as, for instance, Porphyry's edition of Plotinus' works. Instead, according to Barnes, Andronicus merely "tidied up" the overall structure of the treatises, and his editorial work is best characterized as "amateur tinkering."[5]

The authenticity of *De generatione et corruptione* is beyond dispute. Its composition has been generally ascribed to the period when Aristotle resided in Lesbos and Macedonia, c. 347 to 335 BC. None of the Greek mansucripts in which *De generatione* has survived, among them the famous Parisian codex graecus 1853, goes, however, back further than the tenth century. In ancient catalogues such as Ptolemy's, *De generatione et corruptione* appears just after the *Physica* and the *De caelo* and is followed by the *Meteorologica*.[6] This order is systematic and didactic, rather than that it reflects the order of writing. In any case, the opening passage of the *Meteorologica* indicates that these four works were considered to form a coherent unity:

> We have already discussed the first causes of nature, and all natural motion, also the stars ordered in the motion of the heavens, and the corporeal elements — enumerating and specifying them and showing how they change into one another — and becoming and perishing in general. There remains for consideration a part of this inquiry which all our predecessors called meteorology.[7]

Starting with the *Physics*, which examines in books 1 and 2 the causes of nature and in books 3-8 natural motion in all its aspects, Aristotle subsequently dealt with the celestial motions in *De caelo*, books 1 and 2, and the number and nature of the bodily elements in *De caelo*, books 3 and 4. "Becoming and perishing in general" is an adequate description of Aristotle's concerns in *De generatione et corruptione* as they are defined in its opening lines:

> Our task is now to pick out the causes and definitions of generation and corruption common to all those things which come to be and perish in the course of nature; and secondly to investigate growth and alteration, asking what each of them is, and whether we are to

4. The date of Andronicus' activities is controversial. See Moraux, *Der Aristotelismus*, pp. 45-58, for an early dating and Barnes, "Roman Aristotle," pp. 21-24, for a later dating.
5. Barnes, "Roman Aristotle," p. 65. See also Moraux, *Der Aristotelismus*, pp. 62-63, who argued that Aristotle's texts were not a pile of unorganized notes before Andronicus.
6. Moraux, *Der Aristotelismus*, p. 86.
7. Cf. Aristotle, *Meteorologica*, 338a20-338b20. The translation is borrowed from *The Complete Works of Aristotle* (Barnes), Vol. 1, p. 554.

> suppose that the nature of alteration and generation is the same or different, as they are certainly distinguished in name.[8]

As usual, Aristotle starts his investigations with a survey of the views of some of his predecessors. He divides them into two categories; there are those who explain the multitude of appearances in the world by one underlying substance, and those who attribute it to a multitude of separate substances. The former deny the reality of generation and reduce it to alteration, that is, to qualitative changes of this one substance. The latter, among whom the Atomists, consider generation and corruption as the aggregation and segregation of elementary bodies.[9]

According to Aristotle, generation should not be identified with alteration; they are different types of change. At the same time, he disagrees with the Atomists and other pluralists, denying that generation and corruption amount to the aggregation and segregation of elementary substances: "generation cannot possibly be aggregation — not of the sort some people say it is."[10] Aristotle's rejection of this view is founded on his rejection of the essential atomist assumption that "the primary existences are things which have size and are indivisible."[11] The remainder of chapter 2 is therefore devoted to infinite divisibility. The essay by John Murdoch in the present volume is devoted to the medieval, and, to a lesser extent, the Renaissance *fortuna* of the arguments ascribed to Democritus in support of the position so fiercly combatted by Aristotle.

Next, Aristotle proceeds to develop his own notion of generation or coming to be. First, he analyses the ambiguity between "unqualified coming to be" and "coming to be something from being something," or, in modern usage, the difference between "to be" as existential verb and as copula.[12] One of the main problems Aristotle has to tackle is the ancient maxim that "nothing can come to be out of nothing" which seems to be contradicted by his own view that substances can come into being. He has already dealt with this view in the *Physics*, but now returns to it.[13] The maxim goes back to the Eleatic philosophers Parmenides and Zeno, who maintained that none of the things that exist come into being or pass away, or, in other words, that change is only apparent. According to Aristotle's report, they had argued that what comes to be must either do so from what already is, in which case it is no veritable coming to

8. Aristotle, *De generatione et corruptione*, 314a1-6. The translation is borrowed from Williams, p. 1.
9. Aristotle, *De generatione et corruptione*, 314a7-15, and *Physica* 187a11-26.
10. Aristotle, *De generatione et corruptione*, 317a30-32.
11. Aristotle, *De generatione et corruptione* 315b26-27. The translation is borrowed from Williams.
12. Especially Williams, in the introduction to his Aristotle, *De generatione et corruptione*, pp. xi-xvi, has developed this aspect.
13. Aristotle, *De generatione et corruptione*, 317b13, which refers to *Physica*, I, 6-9.

be, or from nothing at all. The latter option, however, seemed absurd. On these logical grounds they denied that change was possible.

In the *Physics*, Aristotle starts from the commonsense assumption that perceived change is real. With the help of his doctrine of form and matter, he then tries to solve the logical impasse. He considers the objects in the world as composites of underlying matter and imposed form. From the perspective of matter, change involves continuation. The underlying substrate does not change. From the perspective of form, however, change involves real change, because it consists of the successive replacement of one form by another. In Aristotle's view, the replacement of one form by another is not a transition from non-being to being, but rather a passage from potential being to actual being. Thus, matter is the cause of the perpetuity of generation and corruption. Generation is therefore not a coming to be out of what is not, and corruption is not the passing of things into nothing.

In chapters 4 and 5 of book 1 of *De generatione et corruptione*, Aristotle discusses two other types of change, namely alteration and growth. Both can be characterized as accidental changes, whereas generation and corruption are substantial changes. Alteration is a change from one contrary to the other in respect of "affection and quality." Growth, on the other hand, is change in respect of quantity or size. Moreover, it involves a special change of place, namely expansion.

Chapters 6-10 are preparing the ground for Aristotle's discussion of the elements in book 2. They are devoted to a few related concepts, such as what it is for things to act on one another (*actio*), to undergo action (*passio*), and to mix. In addition, Aristotle examines "contact" which is implied by the interaction of the elements.

Book 2 examines the causes of generation and corruption. They are the elements which by mixing constitute the substances. The elements correspond to the two fundamental pairs of contrarieties: wet – dry, and hot – cold. All other qualities can be reduced to these tangible qualities. Each of the elements earth, fire, air, and water is constituted by a pair of the fundamental qualities. Fire, for instance, is hot and dry, whereas air is hot and wet. Since each element contains a contrary quality, they can change into each other. None of the elements is primary.

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Book 2 is rounded off with a discussion of necessity in the world of generation and corruption. For according to Aristotle, the succession of generations

and corruptions is indeed necessary. He attributes the necessity of this cyclical process to the circular movement of the sun. In the realm of individual generations and corruptions, however, there is no absolute necessity, but only conditional necessity. A generation is necessary in view of certain conditions which first need to be fulfilled.

As is the case with almost anything that Aristotle has written, the interpretation of many aspects of his views in *De generatione et corruptione* have come to be the subject matter of some debate. In particular his theories of prime matter, of mixture, and of necessity and contingency have received the attention of contemporary scholars.[14] But the process of interpreting His Master's voice started already in Greek Antiquity.

## The Greek commentary tradition

Only few commentaries on *De generatione et corruptione* by Greek commentators have survived: one by Philoponus, and through it, fragments of Alexander of Aphrodisias' lost commentary on *De generatione et corruptione*; and further Alexander's *De mixtione*, which discusses themes from Aristotle's *De generatione et corruptione* and in particular his theory of mixture.[15]

The articles by Frans de Haas and Henk Kubbinga in the present volume address this Greek tradition and in particular its response to problems that were raised by Aristotle's account of mixture in *De generatione et corruptione* book 1, chapter 10. Their discussions include authors such as Simplicius and Themistius who treated these problems in their commentaries on other works by Aristotle.

As is well known, Aristotle distinguishes mixing (*mixis*) from two other processes, namely generation and corruption, and mechanical mixing or composition (*synthesis*). Both distinctions have raised a number of problems for subsequent commentators. The first distinction raises questions concerning the existence of the ingredients, whereas the second raises questions about their nature. According to Aristotle, the main contrast between mixing (*mixis*), on the one hand, and generation and corruption, on the other, is that the ingredients in a mixture somehow survive, whereas in corruption the ingredients

14. Cf. Lewis' contribution on Aristotle's notion of mixture in Lewis e.a. (eds.), *Form, Matter, and Mixture*; Richard Bemelmans, for instance, has questioned the tradition which attributes to Aristotle the notion of *prima materia* as utterly formless. See Bemelmans, *Materia prima in Aristoteles*, esp. pp. 168-204 and 338-393, which deal with passages in *De generatione et corruptione*. See further De Haas, *John Philoponus' New Definition*, which analyses Philoponus' concept of prime matter and its relation to the ancient commentary tradition. Necessity and contingency are discussed in Williams, in his Aristotle, *De generatione et corruptione*, pp. 199-203.

15. Ever since the start of Richard Sorabji's project of translating the Greek commentators into English and of providing their works with a philosophical analysis, the interest in these texts has undergone a revival. Over more than thirty volumes have appeared by now, among them C. J. F. Williams' posthumously published partial translation of Philoponus' commentary. Cf. Philoponus, *On Aristotle*.

perish. More specifically, the ingredients in a mixture are not destroyed, but remain in the mixture in potentiality and are capable of being separated again (327b23-30). But what does it mean to say that the ingredients are preserved in potentiality if a *mixis* is a genuine unity sharply contrasted from *synthesis*, an aggregate? And of what kind of potentiality is Aristotle talking here: that of the elementary qualities of the ingredients, or that of their forms? Frans de Haas, in this volume, investigates Philoponus' discussion of these problems and sets it off against the views of Alexander of Aphrodisias, Proclus, and Simplicius. Moreover, he compares their genuine views with those that were attributed to them by Jacopo Zabarella in *De mistione*, which constitutes a chapter of his *De rebus naturalibus*.

Aristotle's distinction between *mixis* and *synthesis* raises puzzles about the nature of their respective ingredients. In his discussion of the cases where mixing in the proper sense (*mixis*) occurs, Aristotle rejects two alternative accounts (327b31-328a18). According to the first account, mixing occurs when "pieces" of different ingredients are "placed side by side in such a way that each of them is not apparent to perception."[16] Aristotle refutes this view, for it identifies "being mixed" with aggregation for those who, like Lynceus, with their penetrating glance can perceive that mixtures are actually heaps of particles.[17] The second account claims that mixing occurs when the smallest possible parts of two ingredients are "arranged in such a way that every single part of either of the things mixed is alongside some part of the other."[18] Aristotle rejects this view on the grounds that a division into smallest possible particles is impossible.

In his article, Henk Kubbinga claims that Aristotle's discussion of these alternative views contains an inconsistency. For on the one hand, he denies that a body can be divided into its smallest parts (*elachista*), and yet, on the other, he claims that a *mixis* results precisely in a mixture of which every part is of the same nature as every other and as the whole. Taking his lead from a few brief remarks in Andreas van Melsen's classical study on the history of atomism, Kubbinga follows the fortune of the concept of *elachiston*, the Greek equivalent of *minimum*, in the Greek commentary tradition.[19] He believes that Philoponus' notion of *elachiston* as a substantive unity was an important step of the conceptual development towards the molecular theories in the seventeenth century, such as those formulated by Isaac Beeckman and Sébastien Basson.

16. Aristotle, *De generatione et corruptione*, 327b33-34, as translated by Williams.
17. The image of the sharp-eyed Lynceus and its role in seventeenth-century discussions of the microscope and telescope is discussed in Lüthy "Atomism," pp. 6-13.
18. Aristotle, *De generatione et corruptione*, 327b36-328a2 as translated by Williams.
19. See Van Melsen, *From Atomos to Atom*, pp. 47-48.

## The Latin Translations

By the end of the twelfth century, the majority of Aristotle's works had been translated into Latin. The Latin translations furnished the conditions of the development of natural philosophy in the universities of Western Europe during the Late Middle Ages. The full significance of the response to Aristotle's *libri naturales* — and to his other works as well, for that matter — in the West can be better understood with the help of A. I. Sabra's terminology of "appropriation" and "naturalization."[20] Appropriation and naturalization imply that the transmission of Aristotle's works was more than merely a chapter in the history of the preservation of the Classical tradition. The translation movement represents the process of appropriation, which was a decidely *active* process: the Greek science and philosophy were not pressed upon the Latin West.[21] The commentary literature represents the process of naturalization. Over time, the imported Greek knowledge came to be totally absorbed and thoroughly transformed in its new Latin context, even in such a way that the Western culture became its new natural home.

The translations of *De generatione et corruptione* occupied a regular place in the distinct waves of Latin translations of Aristotle.[22] The first wave, which lasted from the end of the fourth until the beginning of the sixth century, only included translations of two of Aristotle's logical treatises, the *Categories* and *De interpretatione*. During the second wave, however, from the beginning of the twelfth until the end of the thirteenth century, *De generatione et corruptione* was translated twice. The first translation was made from the Arabic by Gerard of Cremona. This translation was soon superseded by one that was made directly from the Greek and which was edited in 1972.[23] The Greco-Latin translation was, for a long time, considered anonymous or was attributed to Henry Aristippus. Only a couple of years ago, the translator was correctly identified as Burgund of Pisa. The intricate story of this whodunit and the new light it sheds on the transmission of *De generatione et corruptione* to the West, is discussed by James Otte in the present volume.

On the basis of manuscript evidence, even a third translation of *De generatione et corruptione* has been introduced in the scholarly literature, a *translatio nova*, tentatively attributed to William of Moerbeke. It is not certain at all, however, whether this version is really a distinct translation or revision, rather than a variant redaction of Burgund of Pisa's translation.[24]

20. Sabra, "The Appropriation." Note that Sabra developed this terminology to describe the influx of Greek science into the Islamic world.
21. This aspect is also emphasize, for instance, by Lohr, "The Medieval Interpretation of Aristotle," pp. 82-84.
22. A convenient survey of the distinct translation movements of Aristotle's works is provided by Minio-Paluello, "Aristotle: Tradition and Influence" and further in Dod, "Aristoteles Latinus."
23. Aristoteles, *De generatione et corruptione* (Judycka).
24. See, for instance, Dod, "Aristoteles Latinus," p. 76. Lorenzo Minio-Paluello, however, has

The third wave of translations ran from about 1400 until 1600 and was connected with the humanist movement. This is the least studied phase of the Latin translations.[25] In general, the translations of this period are marked by a new approach towards Aristotle's texts. The medieval literal *verbum e verbo* renderings were replaced by more elegant versions. Geographically, the new translators were located in Italy and in France. During this period, *De generatione et corruptione* saw the appearence of new translations by George of Trebizond, Andronicus Callistus (not printed), Pietro Alcionio, Agostino Nifo, Flaminio Nobili, Joachim Périon with revisions by Nicholas of Grouchy, François Vatable, and Juan Ginés de Sepúlveda.[26] Note, however, that the otherwise prolific Joannes Argyropulos did not leave us a translation of *De generatione et corruptione*.

In addition to Aristotle's own treatises, a number of his important Arabic and Greek commentators were also translated, who will be briefly considered here. Knowledge of the Greek commentaries was only fragmentary in the Latin West. Very few texts were known during the Middle Ages, and there was no commentary on *De generatione et corruptione* among them. Most of the extant commentaries became available in Latin only in the sixteenth century.[27] Until that time, the Greek commentators were only known indirectly, through the intermediary of Arabic sources that had been translated into Latin, notably Avicenna and Averroes.[28] In the case of *De generatione et corruptione*, Averroes seems to have been the most influential source. His Middle Commentary, a paraphrase of Aristotle's text written in 1172, was translated into Latin in the thirteenth century by Michael Scot. The Latin version of Averroes' Epitome, a short compendium, of *De generatione et corruptione* (translated from the Hebrew by Vital Nissus) is from a much later date. It was included in the 1550 Junta edition of Averroes' works.[29]

voiced convincing reservations against the existence of a distinct *translatio nova* of Aristotle's *De generatione et corruptione* by William of Moerbeke. See Minio-Paluello, "Henri Aristippe," reprinted in *Opuscula*, pp. 71-83. But see Judycka, "L'attribution."

25. See Schmitt, *Aristotle and the Renaissance*, pp. 64-88.
26. See Cranz, *A Bibliography*, p. 176, and further Schmitt, *Aristotle and the Renaissance*, pp. 134-148, for short biographical information about these translators. Trebizond's activities as a translator of *De generatione et corruptione* are discussed in Monfasani, *George of Trebizond*, pp. 58-59. Biographical information about Callistus is provided in Perosa, "Inediti." Callistus' translation has been preserved in the MS Firenze, Biblioteca Medicea Laurenziana, Plut. 84, 2.
27. The medieval Latin translations of the Greek commentators are being edited in the series *Corpus Latinorum Commentariorum in Aristotelem Graecorum*. Renaissance translations into Latin of the Greek commentators are reprinted in a new series founded by C. H. Lohr and published by Fromann Holzboog in Frankfurt: *Commentaria in Aristotelem Graeca, versiones Latinae*.
28. See, for instance, Gutras, *Avicenna and the Aristotelian Tradition*, pp. 289-290.
29. See Kurland, in the intoduction to his Averroes, *on Aristotle's De generatione et corruptione*, pp. xi-xiv, and further Cranz, "Editions," p. 125. Averroes' Middle Commentary has been edited in Averroes, *Commentarium medium in Aristotelis De generatione et corruptione libros* (Fobes e.a.).

The low impact of Avicenna in the study of *De generatione et corruptione* is implicitly confirmed by Simone van Riet's essay in the present volume. Avicenna devoted the third treatise of his *Kitab al Shifa*, a philosophical encyclopedia, to a discussion of Aristotle's *De generatione et corruptione*.[30] It was translated into Latin in 1280. As Simone van Riet pointed out, the influence of Avicenna's treatise before 1280 can therefore only have been through intermediaries. Its influence after 1280, such as, for instance, in the fourteenth-century discussions on mixture, may have been direct, but still needs further investigation. The sole surviving Latin copy of Avicenna's *Liber tertius naturalium de generatione et corruptione* dates from 1480.

## The Latin Commentary Tradition

The related but distinct process of naturalizing Aristotle, to return once more to Sabra's terminology, started only in the thirteenth century. Even though by the end of the twelfth century most of his works had been translated into Latin, they came only slowly into circulation. The year 1255 is usually taken as a dramatic turning point in the world of medieval learning. In that year, the arts faculty at Paris passed legislation which prescribed the study of all known works by Aristotle to all students. Other universities too introduced or had already introduced his works into their curricula. For the next four hundred years, they came to be routinely studied and commented upon at all the centers of learning from Messina to Uppsala and Saint Andrews, and from Coimbra to Dorpat. The introduction of Aristotle's works into the curriculum created three new domains of philosophy: moral philosophy, metaphysics, and natural philosophy. The latter was variously designated as *scientia naturalis, physica, philosophia naturalis*, and, in the post-medieval period, as *physiologia*. The main vehicle by which Aristotle's ideas were mastered, assimilated, and further developed was the commentary literature. Up until the seventeenth century, its history runs parallel to the history of science.

Aristotle's "natural books" (*libri naturales*) constituted the core of natural philosophy. The *Physics* was the most important text. It was understood to provide a characterization of the most general principles and properties of natural entities, that is to say, entities that thanks to an inner source were capable of changing. The other *libri naturales*, such as *De Caelo, De Anima, De generatione et corruptione, Meteorologica*, and the *Parva naturalia* were arranged around the *Physics* as treatises that discussed particular aspects of natural objects. The place of *De generatione et corruptione* within the university curriculum has received little attention. The treatise was taught at Paris and Oxford, at Pisa and Padua, both by ordinary and extraordinary professors, and at the

30. Avicenna, *Liber tertius naturalium* (Van Riet).

Collegio Romano, but many aspects still need to be investigated, in particular the remarkable growth of commentaries which the Renaissance experienced.[31]

The exploration of the commentary tradition on this treatise has fared only slightly better. Editions have appeared of the commentaries by Giles of Orléans, Albert the Great, Thomas Aquinas (which was finished by Thomas of Sutton), Boethius of Dacia, and Nicholas Oresme.[32] Recently, Stefano Caroti has suggested that the *quaestiones* literature on *De generatione et corruptione* may have had their (remote) origin in Albert the Great's *digressiones* in his own paraphrase of that text.[33]

So far only few doctrinal aspects of the commentary tradition have been studied. Most attention has been devoted to the commentaries on *De generatione et corruptione* that were produced by the so-called Buridan School, that is, John Buridan, Albert of Saxony, Nicholas Oresme, and Marsilius of Inghen. In a classical study, for instance, Anneliese Maier has examined their respective views on the problem of *mixtio*, thereby uncovering also important information about the medieval mansucripts in which their texts have been preserved.[34] Joan Cadden has studied Albert of Saxony's and Marsilius of Inghen's theories of biological growth (*augmentatio*) and has compared them to those of Albert the Great and Thomas Aquinas.[35] Henk Braakhuis has edited John Buridan's *quaestio* on whether a body that has been destroyed can return as numerically the same, and examined its philosophical context.[36] Stefano Caroti wrote an exhaustive study of the discussion of *reactio*, that is, the interaction between agent and patient in an action, by the Buridan school, and has provided an extensive survey of the topics that are discussed in Nicholas Oresme's *Quaestiones* on *De generatione et corruptione*.[37]

The trend to focus research on what, by lack of any better term, will continue to be called the "Buridan School," is also apparent in this volume. Jürgen

31. See note 2, and further Wallace, "Traditional Natural Philosophy," pp. 212-213.
32. Aegidius Aurelianensis, *Quaestiones super De generatione et corruptione* (Kuksewicz); Albertus Magnus, *De generatione et corruptione* (Hossfeld); Thomas Aquinas, *In Aristotelis libros De caelo et mundo, De generatione et corruptione, Meteorologicorum expositio* (Spiazzi); Thomas de Sutton, *De generatione et corruptione* (Kelley); Boethius Dacus, *Quaestiones De generatione et corruptione* (Sajó); Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti). A critical edition of Marsilius of Inghen's *Quaestiones in libros De generatione et corruptione* is being prepared by Thijssen.
33. Caroti, "Note."
34. Maier, *An der Grenze*, esp. pp. 118-137. Maier's suggestion that Nicole Oresme was the author of the commentary on *De generatione et corruptione* preserved in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097 was refuted in Thijssen, "Buridan." See also Michael, *Johannes Buridan*, II, pp. 631-648.
35. Cadden, *The Medieval Philosophy and Biology of Growth*. Albert the Great's commentary is, furthermore, studied in Hossfeld, "Grundgedanken."
36. Braakhuis, "John Buridan."
37. Caroti, "Da Buridano,' and Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), pp. 13*-199*.

Sarnowsky surveys the main themes that are discussed in Albert of Saxony's commentary on *De generatione et corruptione*. Interestingly, Albert's commentary is not preceded by a typical preface which indicates the position of the treatise in the larger framework of natural philosophy. Instead, Albert only observes that *De generatione*'s subject is the *ens mobile ad formam* and then proceeds to list its four main topics, i.e. generation and corruption, augmentation, alteration, and mixture.[38] According to Sarnowsky, Alberts' *De generatione* commentary has the character of an appendix to his *Physics*.

As Sarnowsky observes, it was printed ten times, while only three manuscripts have survived. The printed editions are all derived from the Padua edition of 1480, and were mainly distributed in Italy. There were two Parisian editions. In the Italian editions, Albert's texts is printed together with the commentaries by Giles of Rome and Marsilius of Inghen. It is noteworthy that the dissemination of Marsilius' commentary shows a somewhat different pattern. In addition to the many printed editions, Marisilius' text has been preserved in over twenty manuscripts, most of which are of Italian origin. Moreover, some of his views were literally quoted in (Italian) debates that took place in the fifteenth and sixteenth centuries.[39]

Stefano Caroti investigates the commentary by Nicholas Oresme, more in particular the latter's views on individuation and the related notions of contingency and necessity in the causal order. Oresme's discussion is focused on the numerical distinction of natural effects in the causal order, which takes place through time: every effect is generated at a different instant.

The essay by Henk Braakhuis is devoted to a problem addressed by John Buridan at the opening of his commentary on *De generatione et corruptione*, namely how it is possible to have certain knowledge (*scientia*) about things that have ceased to exist. Buridan takes a semantic approach to this problem and introduces the terminology of *suppositio naturalis* to deal with the meaning of terms that refer to empty classes. Braakhuis studies both versions of Buridan's commentary and presents an edition of the relevant passages in an appendix.

Silvia Donati nicely complements Henk Braakhuis' paper, for she examines thirteenth-century views on scientific knowledge about things that are (temporarily) non-existent. Donati pays special attention to the *Expositor*, Giles of Rome (who was also often quoted by Buridan), and investigates his influence on thirteenth-century authors, both at Oxford and Paris.

38. Such a preface is provided by John Buridan in his *Quaestiones super libros De generatione et corruptione*. It offers a division of natural philosophy, identifying two basic types of change in Aristotle's *libri naturales*: local change (*ad ubi*) and change involving the substantial form (*ad formam*). The latter's general principles are precisely discussed in *De generatione et corruptione*. Buridan's prologue has been edited in Thijssen, *Johannes Buridanus*, vol. 2, pp. 118-121.
39. Thijssen, "The Circulation."

The final essay in this volume, written by Anita Guerrini, tackles Robert Boyle's attitude toward the Aristotelian tradition. The corpuscularian Boyle is usually remembered as one of the figure-heads of the mechanical philosophy, which, according to traditional historiography, was radically opposed to Aristotelianism. As a matter of fact, however, Boyle's attitude toward the Aristotelian heritage was more complex. In spite of his criticism, in the *The Origin of Forms and Qualities*, of Aristotelian natural philosophy, he could not entirely disengage himself from its terminology of forms, matter, qualities, and mixture.[40]

Ironically, with the corpuscularian philosophy of the seventeenth century, of which atomism was a variant, we have come to a full circle. It was precisely the Atomists that Aristotle had attempted to refute at the beginning of his *De generatione et corruptione* and whose doctrine of generation — which in Aristotle's view was more correctly characterized as aggregation — he replaced by his own theory of matter and form. In the seventeenth century, it was the atomists who, rightly or wrongly, believed to have refuted Aristotelian hylemorphism. The role of the commentary tradition on *De generatione et corruptione* in this complex history has not yet received due recognition, nor many other of its aspects, as this brief survey has tried to show.[41]

40. The complexity of the interaction between hylemorphism and atomism, certainly on a terminological level, is clearly illustrated in Newman e.a. (eds.), *The Fate of Hylemorphism*, more in particular in Stephen Clucas' contribution "The Infinite Variety of Formes and Magnitude," pp. 268-271. See further Newman, "The Alchemical Sources" which points at Boyle's debt to the Aristotelian view that the ingredients of a mixture can be fully recovered. In particular Daniel Sennert was an important source, as has been elaborated by William Newman in two unpublished papers. Both Sennert and Boyle merged Aristotle's theory of mixture, as explained in *De generatione et corruptione*, with atomism. See further Emerton, *The Scientific Reinterpretation*, which is one of the few attempts at a diachronic study of the concept of form and its transformations from Aristotle up until eigthteenth-century crystallography.

41. Research for this article was financially supported by a grant (200-22-295) from the *Netherlands Organization for Scientific Research* (NWO). I am particularly grateful to Frans de Haas, Cees Leijenhorst, and Christoph Lüthy for their comments on an earlier version of this article.

# Mixture in Philoponus. An Encounter with a Third Kind of Potentiality[1]

*Frans A. J. de Haas*

From Antiquity onwards readers of Aristotle's *De generatione et corruptione* have struggled with the notion of potentiality that is the foundation of Aristotle's theory of mixture. In *De generatione et corruptione* I.10 327b22-31 Aristotle claims that ingredients somehow remain present in the resulting mixture in potentiality (δυνάμει). Only in this way, he explains, is it possible to extract the ingredients from the mixture and to restore them to their previous being in actuality (ἐνεργείᾳ). But what does it mean for ingredients to exist in potentiality if a mixture (μίξις) is a genuine unity sharply to be distinguished from a mere aggregate (σύνθεσις) as Aristotle stipulates in the same chapter? Do the ingredients not simply perish, so that Aristotle has recourse to a mysterious kind of potentiality only to meet his requirement that the ingredients can be extracted from the mixture again? The problem gains momentum when we realise that Aristotle's theory of mixture is crucial to his view of the constitution of the physical world. According to Aristotle each and every composite in the sublunary realm is a mixture of all four elements.[2] The homeomerous materials, such as blood, bile, bone, and flesh consist in such a mixture; they in turn make up the anhomeomerous parts of sublunary substances. Without the theory of mixture, therefore, the material composition of every entity over and above the elements would remain completely unaccounted for.

In a rather neglected Renaissance study of this problem, Jacopo Zabarella's *De mistione*,[3] we find a neat classification of the solutions its author has found in his sources:

1. This paper has much profited from discussions with audiences at the Universities of Amsterdam, Groningen and the De Wulf-Mansion Centre at Leuven, as well as from the insightful comments of Richard Sorabji, Sylvia Berryman, and my colleagues at the Utrecht University Department of Philosophy: Jaap Mansfeld, Keimpe Algra, Cees Leijenhorst and Irma Croese. Over the past three years my research was supported in turn by the Foundation for Research in the Fields of Philosophy and Theology (SFT), subsidised by the Netherlands Organisation for Scientific Research (NWO); The Niels Stensen Foundation; and at present the Royal Netherlands Academy of Arts and Sciences.

2. See Aristoteles, *De generatione et corruptione*, II.7 334b16-18; II.8 *passim*.

3. The *De mistione* is contained in Jacobus Zabarella, *De rebus naturalibus* (Frankfurt, 1606 – 1607). Cf. Emerton, *The Scientific Reinterpretation*, pp. 79-80.

1. the substantial forms of the elements are preserved integrally, but the basic qualities are reduced (cap. II: Avicenna),[4]
2. both the forms and the qualities are preserved in reduced actuality, which explains in what sense the elements cease to be in favour of the *forma misti* (cap. III: Averroes),[5]
3. both the forms and the qualities perish in the mixture and a new form and a new quality are generated, which exhibit only a degree of similarity with the original forms and qualities (cap. IV: Duns Scotus),[6]
4. the forms perish entirely, but the qualities are preserved in reduced actuality, which is apparent from the fact that their potencies (*vires* or *virtutes*) are found in the mixture (cap. V: Marsilius of Inghen,[7] Thomas Aquinas,[8] Aegidius Romanus,[9] Ludovicus Buccaferreus,[10] etc.).

As it turns out, the second view is the one Zabarella himself supports. Hence this view is most elaborately discussed and defended in chapters VII-XIII of

4. Cf. Avicenna, *Liber tertius naturalium* (Van Riet), cap. 7: *Capitulum de destructione cuiusdam novae opinionis in mixtione elementorum*. The action and passion of the elementary qualities presupposes the actual presence of the elements themselves, whose essences should not be identified with the activities they give rise to.
5. Cf. Averroes, *Media expositio in Aristotelis De generatione et corruptione* (Venezia, 1562 – 1574), comm. 82-90, pp. 86-94; cf. *Paraphrasis super librum De generatione et corruptione Aristotelis* (Venezia, 1562 – 1574), pp. 392-393, and *In quattuor libros De caelo Aristotelis paraphrasis* (Venezia, 1562 – 1574), comm. 67, pp. 227-228.
6. Cf. Johannes Duns Scotus, *Reportata Parisiensia Super Sententias*, lib. 2, dist. 15, q. un. (vol. 23): *Utrum maneant elementa in mixto*. Here Scotus explicitly opposes both Avicenna and Averroes by insisting that *numquam sunt plura ponenda sine necessitate*: there is only a single *forma mixti* present in the compound. The forms of the elements merely exist *in virtute* in the sense in which any higher order form (e.g. rational soul) subsumes lesser forms (e.g. vegetative and sensitive soul) in a new unity, with the lesser forms surviving neither integrally (Avicenna) nor in reduced actuality (Averroes).
7. Cf. Marsilius de Inghen, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505), lib. 1, q. 22 *Utrum elementa maneant formaliter in mixto*, esp. p. 95$^{ra}$. Cf. in the same volume Albertus de Saxonia, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505), lib. 1, q. 19, esp. p. 145$^{v}$.
8. Cf. Thomas Aquinas, *De mixtione elementorum* (Leonina).
9. Cf. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), esp. comm. 90. This line of argument can also be found in Boethius Dacus, *Quaestiones De generatione et corruptione* (Sajó), vol. 5, pars I, q. 52b.
10. Cf. Ludovicus Buccaferreus, *In duos libros De generatione and corruptione* (Venezia, 1571), textus 82 ff., pp. 122 ff., see esp. p. 124 for the *potentia quadam quae dicitur potentia media* being explicitly attributed to "Johannes" *scil.* Philoponus with whom Buccaferreus claims he is going to dissent. He deals with the question *An elementa remaneant in mixtione secundum eorum substantiam* on pp. 132b ff. with his own opinion on pp. 141$^{v}$-142$^{r}$. Buccaferreus defends the opinion that in a mixture all forms, both substantial and accidental, perish. The elements remain only with respect to their primary qualities in a single *complexio*. Rather indiscriminately, he sides with almost every predecessor who stated that the elements remain not *formaliter* but merely *virtualiter* in any sense of the term. All in all Buccaferreus seems to have had a different approach to our problem from Zabarella and therefore he distributes his ancient and medieval predecessors differently. This is not the place to compare their accounts of mixture in more detail.

the *De mistione*. In cap. X Zabarella claims that his view is supported by "the Greek commentators," to wit Alexander's *De mixtione*[11] and Philoponus' *In De generatione et corruptione*.[12] As we shall see, Zabarella's presentation of his sources is not to be trusted entirely. Even if we assume he had access to the original sources the wish to produce ancient authorities for his own position may have influenced his judgement.

A first glance at the four positions reveals that unlike Aristotle they all distinguish between the *forms* of the ingredients and their *qualities*. Moreover, they speak of "reduction" or "reduced actuality" of forms and/or qualities where Aristotle used the term "in potentiality" to describe how the ingredients are preserved in the mixture. This paper will focus on the background of these two characteristics of Zabarella's classification. Why and how did the distinction between forms and qualities become relevant to the problem of mixture, and what does it mean for a form or quality to be preserved in "reduced actuality"?

Zabarella points to Alexander (*fl.* 205 AD) and Philoponus (c. 485 – 570 AD) as his ancient sources for the view he favours. Here I shall focus mainly on Philoponus' *In De generatione et corruptione*, which is still influential in modern times,[13] with a brief look at Alexander as a source of inspiration for Philoponus, and a more elaborate look at Proclus and Simplicius who provide a Neoplatonic alternative to Philoponus' view of mixture. First, however, a survey of the relevant statements in Aristotle is called for.

11. Alexander Aphrodisiensis, *De mixtione* (Bruns). Alexander's *De mixtione* is an independent treatise attacking the Stoic theory of mixture and defending Alexander's own Peripatetically inspired concept of mixture. For a translation and commentary see Todd.
12. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli). Zabarella (1533 – 1589) may have had access to the Aldine edition of the Greek text of this commentary (*Ioannes grammaticus in libros De generatione et interitu*, Venice 1527, with a preface by Andreas Ausulanus), which was reprinted with slight variations. In the Aldine edition Philoponus' commentary is conveniently combined with Alexander's *De mixtione* in a single volume: *Ioannes grammaticus in libros de generatione et interitu. Alexander Aphrodisiensis in meteorologica. Idem de mixtione*. According to Vitelli *o.c.*, p. x, this edition was perhaps based on (a descendant of) the inferior manuscript Marcianus Ven. 232 (= T) dating from the fourteenth century. — Zabarella may also have used the Latin translation of Philoponus' commentary by Hieronymus Bagolinus of Verona (Venice 1549 and reprints), which closely follows the Aldine text. However, Zabarella's Latin technical vocabulary is entirely different from Bagolini's. E.g. for εἰλικρινῶς Zabarella has *perfecte* throughout, whereas Bagolini prefers *syncere*; for κεκολασμένος Zabarella has *obfuscatus, impuratus, incompletus, imperfectus* where Bagolini prefers *temperatum, castigatum*; for τὰς ὑπερβολὰς κολάζει μόνον Zabarella has *frangere mutuo excellentias suas* where Bagolini translates *excessus domet solum*. Hence, it seems likely that Zabarella gives his own rendering of the Greek text — whether he knew the Bagolini translation or not.
13. Cf. Joachim in Aristotle, *On Coming-to-be & Passing-away*, p. ix: "The commentary of Philoponos is very valuable as an aid to the interpretation of Aristotle's treatise, and I have used it freely in my notes"; Aristotle, *De generatione et corruptione* (Williams), index s.v. "Philoponus."

## Aristotle

*How* and *why* did Aristotle introduce the potentiality of mixed ingredients?[14] It serves as the solution to a problem raised at the beginning of chapter I.10 of the *De generatione et corruptione*, 327a34-b6. Aristotle tells us that some people[15] claim that mixture does not exist. In the sample case[16] of a mixture of two ingredients

1. either the two ingredients are preserved unaltered (*Preservation*), or
2. one of the two perishes because it is overcome by the other (*Domination*), or
3. both perish (*Corruption*).

The opponents point out that in the case of Preservation it makes no sense to speak of a *mixture* of the ingredients because this state is indistinguishable from the unmixed state. The case of Domination is a case of generation & corruption instead of mixture, and violates the principle that all mixed ingredients should be on an equal footing in the mixture. In the case of Corruption it makes no sense to speak of a mixture *of these ingredients* since both of them have perished in the process. Hence mixture does not exist.

If Aristotle wants to hold on to the notion of mixture (which he does), it seems fair to assume that he will try to show *both* (I) that mixture does not collapse into generation and/or corruption, neither in part (against 2) nor in whole (against 3), *and* (II) that mixture consists in a genuine change of the mixables (against 1). Indeed, in *De generatione et corruptione* I.10 327b6-10 Aristotle announces that the problem set out earlier can be solved when two differences are brought to light, the first between mixture and generation & corruption, the second between what is mixable (μικτόν) and what is generable & corruptible (γεννητόν, φθαρτόν). These two differences are the topic of the remainder of *De generatione et corruptione* I.10 327b10-31. In my view

14. The literature on Aristotle's theory of mixture is extensive. Apart from the classics Joachim, "Aristotle's Conception"; Aristotle, *On Coming-to-be & Passing-away* (Joachim); Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*, and Aristotle, *De generatione et corruptione* (Williams), I have found most useful the exchange between Sorabji, "The Greek Origins" and Lennox, "Commentary on Sorabji"; Sorabji, *Matter, Space and Motion*, ch. 5; Code, "Potentiality," and Eric Lewis in Alexander of Aphrodisias, *On Aristotle Meteorology 4*, esp. pp. 42-44. On potentiality in Aristotle and his interpreters see also McMullin, "Four Senses of Potency."
15. In view of the Zenonian structure of the argument Kent Sprague has suggested that the argument derives from neo-Eleatic sophistical contemporaries of Aristotle's. However, since she is not convinced by Aristotle's solution she tends to overestimate the power of the argument and believes that Aristotle's theory is actually defeated by it. Cf. also Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*, pp. 47-48.
16. For simplicity's sake the argument is confined to the case of a mixture of two ingredients, whereas Aristotle's more considered view is that each sublunary mixture contains all four elements, cf. Aristoteles, *De generatione et corruptione*, II.8.

Aristotle only aims to achieve (I) in *De generatione et corruptione* I.10. For a discussion of (II) we have to wait until *De generatione et corruptione* II.7.[17]

In order to establish a difference between mixture and generation & corruption Aristotle has to defuse the radical distinction between being and not-being on which the argument of his opponents turns. This he achieves by introducing the famous distinction between actual and potential being. Here is how Aristotle introduces the potentiality of mixed ingredients:[18]

> Since, however, some things that are, are in potentiality, and some in actuality, it is possible for things that have been mixed, in some way to be and not to be. For that which has come to be from them [i.e. the mixture] is something else in actuality, whereas each [of them] is still in potentiality what they were before they were mixed, i.e. has not been destroyed[19] — which the previous aporetic argument tried to show.[20] Moreover, it is manifest that things that are mixed come together from having formerly been separate, and are capable of being separated again. So neither do they both remain in actuality like the body and its whiteness,[21] nor do they perish — either of them or both — because their potentiality is preserved. (tr. after Williams)

17. Contrary to later interpretations, I do not believe that *De generatione et corruptione*, 327b30-31 σώζεται ἡ δύναμις αὐτῶν refers to the powers of the elementary qualities hot, cold, moist, and dry for the simple reason that Aristotle has not yet introduced these powers at this stage. Instead, I take it that after rejecting Preservation, Domination and Corruption in 327b29-30 Aristotle uses ἡ δύναμις αὐτῶν to pick up the δυνάμει of 327b25; "their potentiality" is equivalent to "their potential existence." For the alternation between δύναμις and δυνάμει in this sense cf. e.g. *Metaphysica*, IX.6 1048a25-35, XIII.10 1087a16.
18. Aristoteles, *De generatione et corruptione*, I.10 327b22-31: "Ἐπεὶ δ' ἐστὶ τὰ μὲν δυνάμει τὰ δ' ἐνεργείᾳ τῶν ὄντων, ἐνδέχεται τὰ μιχθέντα εἶναί πως καὶ μὴ εἶναι, ἐνεργείᾳ μὲν ἕτέρου ὄντος τοῦ γεγονότος ἐξ αὐτῶν, δυνάμει δ' ἔτι ἑκατέρου ἅπερ ἦσαν πρὶν μιχθῆναι, καὶ οὐκ ἀπολωλότα· τοῦτο γὰρ ὁ λόγος διηπόρει πρότερον· φαίνεται δὲ τὰ μιγνύμενα πρότερόν τε ἐκ κεχωρισμένων συνιόντα καὶ δυνάμενα χωρίζεσθαι πάλιν· οὔτε διαμένουσιν οὖν ἐνεργείᾳ ὥσπερ τὸ σῶμα καὶ τὸ λευκόν, οὔτε φθείρονται, οὔτε θάτερον οὐτ' ἄμφω· σώζεται γὰρ ἡ δύναμις αὐτῶν."
19. It is difficult to decide whether this tantalizing sentence allots the potential being to the ingredients, or the mixture. Keimpe Algra suggested to me the following alternative translation: let 327b25-26 ἑκατέρου be the subject complement on a par with 327b25 ἑτέρου, and τοῦ γεγονότος ἐξ αὐτῶν the grammatical subject throughout: "For that which has come to be from them [i.e. the mixture] is something else in actuality, whereas *it* [i.e. the mixture] is still in potentiality each [of the things] that were before the mixture occurred, and have not been destroyed." Cf. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 191[16-17]. Although it seems that neither alternative can be ruled out, I have a slight preference for the translation adopted in the text because it keeps the grammatical focus on τὰ μιχθέντα rather than shifting to the mixture and reverting to τὰ μιγνύμενα again in the sequel 327b27 ff. Cf. H. H. Joachim in *The Complete Works of Aristotle* (Barnes), vol. I, p. 536.
20. Cf. H. H. Joachim in *The Complete Works of Aristotle* (Barnes), p. 536: "This was the difficulty that emerged in the previous argument." Contrast Aristotle, *De generatione et corruptione* (Williams), p. 34: "This is the solution to the problem raised by the previous argument," which seems too much for the imperfect of διαπορεῖν. I suggest that the imperfect is intended to underline that the previous argument was still incomplete, and awaited Aristotle to bring out the implication just stated.
21. From 327b15-17 it is clear that the union of body and whiteness and other affections and dispositions is not a mixture because this is an example of Preservation: their union leaves them untouched.

The actuality-potentiality distinction clearly addresses the distinction between separation and the specific type of unification found in a mixture, i.e. a unification of things that have formerly been separate. The previous analysis of the problem yields that if mixture is to exist next to generation & corruption the ingredients cannot have been destroyed. *Ipso facto* they must be capable of regaining their previous separate existence, as everyday examples such as the mixture of wine and water testify.[22] Judging from this text potential existence consists in this separability.[23]

In view of later interpretations it is important to note that Aristotle nowhere suggests that he attributes this potentiality to the primary qualities hot, cold, dry, and moist. As a properly dialectical argument *De generatione et corruptione* I.10 operates entirely within the confines of the initial problem and the obvious fact that mixture is opposed to separation. The latter gives rise to an analysis of separation and union from which mixture emerges as a specific kind of union *in these very terms*: it is a union of items all of which existed separately before they were united. Needless to say, the primary qualities are not such items. It is paramount to insist on the limited scope of *De generatione et corruptione* I.10, and, by consequence, the limited scope of the well-defined notion of potentiality introduced in it.

So far, Aristotle has shown how we may conceive of the mode of being of the ingredients of a mixture. However, we have not been presented with an account of the change the mixables undergo in order to be unified in a mixture, other than the suggestion that its beginning and end terms are separation and lack of separation. The concise closing statement of *De generatione et corruptione* I.10 that "mixture is the unification of things altered" affirms that Aristotle is still

22. According to Stobaeus *Eclogae*, I.17, p. $54^{8-11}$ W (*Stoicorum veterum fragmenta* [von Arnim], p. $153^{21-23}$) water and wine can be separated by means of a sponge; see *Alexander of Aphrodisias on Stoic Physics* (Todd), p. 241 *ad* p. $232^{2-5}$ with Sambursky, "On Some References," pp. 332-333. Cf. Nemesius, *De natura hominis* (Moriani), 3, c. 128-129, p. 39c, where this example serves to illustrate the preservation of constituents in a blend below the level of perception, a theory attributed to Democritus by Alexander at *De mixtione* (Bruns), II, p. $214^{18-28}$ and similarly *De mixtione*, XV, p. $232^{18-20}$: "ἔπεται δὲ τῇ ἐπὶ τῶν κεκραμένων τοιαύτῃ μεταβολῇ [ἢ] τὸ διακρίνεσθαι δύνασθαι δοκεῖν αὐτά, ὅτι καὶ τὴν ἀρχὴν ἐκ μίξεως τοιούτων ἡ γένεσις τῷ ταῦτα πάσχοντι σώματι." Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), I.10 327b27, p. $191^{29-31}$ explains that when a mixture of wine and water is pressed through water-lettuce only the water is drawn up, especially when the wine is thick. In commenting on Aristotle's claim that ingredients can be separated again Philoponus *In De generatione et corruptione*, pp. $191^{31}$-$192^{4}$ carefully adds that even if there are no means to neatly separate the ingredients they should still be regarded as separable because they are capable of existing independently (καθ' ἑαυτὰ ὑποστῆναι) insofar as depends on them (ὅσον ἐφ' ἑαυτοῖς). The tools fail to oblige the theory, not the ingredients.

23. Here I have no space to elaborate on how precisely this separation is supposed to take place. Cf. Joachim, "Aristotle's Conception," pp. 81-86, stressing the importance of Aristoteles, *Meteorologica*, IV.1. Most recently Lewis pp. 3-15 has convincingly defended the authenticity and importance of *Meteorologica*, IV in the introduction to his Alexander of Aphrodisias, *On Aristotle Meteorology 4*.

aware that some kind of alteration is needed to escape the objection that mixture makes no difference (against 1). Yet, he has not given the slightest indication as to the nature of this alteration, in spite of the contrast between the sense of the term "alteration" in the initial statement of the problem and in *De generatione et corruptione* I.4.[24]

We have to wait until *De generatione et corruptione* II.7 before more is revealed about the alteration of the mixables. In *De generatione et corruptione* II.1-6 Aristotle has developed a sophisticated theory of the nature and role of the primary qualities hot, cold, moist, and dry in the constitution and change of the elements "out of" each other. In *De generatione et corruptione* II.7 Aristotle points out that if we want to say that homeomerous materials like flesh and marrow are "out of" the elements, too, a different understanding of the phrase "out of" is needed. If flesh is constituted "out of" e.g. fire and earth, we seem to have two options:

i. fire and earth both perish so that flesh is neither (which conflicts with the notion that flesh consists of *the elements*), or
ii. fire and earth are preserved which means that flesh is a mere combination (which conflicts with the notion of homeomereity).

This dilemma is similar to the argument against mixture discussed above, so it is not surprising that here the alternative of mixture comes in:

> 1. Is there a possible solution along these lines, taking into account the fact that things can be more or less hot and cold? When one exists *simpliciter* in actuality, the other exists in potentiality; when, however, it is not completely so, but one is cold *qua* hot, the other hot *qua* cold, because in being mixed things destroy each other's excesses, then what will exist is neither their matter nor either of the contraries existing *simpliciter* in actuality, but something intermediate, which, in so far as it is in potentiality more hot than cold or vice versa, is proportionately twice as hot in potentiality as cold, or three times, or in some other similar way.
> 2. It is as a result of the contraries, or rather the elements,[25] having been mixed that the other things [*sc.* the homeomerous compounds] will exist, and the elements from them [*sc.* the compounds], which are in some way ⟨the elements⟩[26] in potentiality, not in the

24. Morrow, "Qualitative Change" provides a thoroughly Platonic interpretation of alteration in Aristotle. He believes that Aristotle does not succeed in upholding the distinction between alteration and generation (Morrow ignores the difference between change in form and change in the whole of both matter and form, Aristoteles *De generatione et corruptione*, I.2 317a23-27). Morrow aims at showing that in spite of Aristotle's claims to the contrary (*Physica*, V) alteration is not in fact a primary kind of change in Aristotle's physics. The qualitative changes surrounding the transformation of the elements and mixture are a case in point (*o.c.*, pp. 159-161, 164-165). As I hope to show elsewhere this interpretation shows a remarkable affinity with the ancient Neoplatonic approach to Aristotle's physics.
25. Cf. Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*, pp. 62-63.
26. Aristotle, *On Coming-to-be & Passing-away* (Joachim), p. 243 and Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*, p. 62 read "and the elements, which are in some way ⟨the contraries⟩ in potentiality, will come to be from [the contraries]." However, with Seeck, *Über die Elemente*, p. 60, n. 1 they take "or rather the elements" as an epexegetical addition to "the contraries" (see previous note). Accordingly, we should take Aristotle as continuing

same way as matter but in the way we have explained.[27] In this way what comes to be is a mixture, in that way it is matter.

3. Since the contraries are also acted upon as stated in the definition in Book I — for the actually hot is cold in potentiality and the actually cold hot in potentiality, so that unless they are in balance they change one into the other, and the same holds in the case of the other contraries — first, the elements change in this way; but flesh and bones and suchlike come from these ⟨elements⟩, the hot becoming cold and the cold hot when they approach the mean, for here they are neither one thing nor the other, and the mean is large and not an indivisible point. Similarly dry and wet and suchlike produce flesh and bone and the rest in the middle range.[28] (tr. Williams, modified).

Aristotle distinguishes between two kinds of potentiality rooted in the primary qualities. *Qua* opposites, they are potentially their opposites; *qua* contraries with latitude between them,[29] they are potentially any intermediate stage on the way towards their opposite. The realisation of these potentialities gives rise to two different changes, which affect the elements in two different ways. When primary qualities change into their opposite the elements suffer substantial change: they perish and are transformed into another element. When primary qualities change into an intermediate stage on their scale under the influence of mutual interaction, i.e. when "they[30] destroy each other's excesses," the elements are

with the elements (334b18, rather than the contraries) as the complement of the compounds. On this interpretation the structure "the compounds out of the elements and vice versa" is set against "one element out of another and vice versa" in order to bring out a different sense of "out of" and a different sense of potentiality (see next note). Cf. also Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 275[31] ff. discussed below.

27. I.e. as explained above in *De generatione et corruptione*, I.10. Joachim *l.c.* refers to both I.10 327b22-31 and II.7 334b8-16 as if the same kind of potentiality were involved throughout. Verdenius *l.c.*, in line with his understanding of the previous sentence, mistakenly refers to the theory of the reciprocal action of contraries in *De generatione et corruptione*, I.7.

28. Aristoteles, *De generatione et corruptione*, II.7 334b7-30: "Ἆρ' οὖν ἐπειδή ἐστι καὶ μᾶλλον καὶ ἧττον θερμὸν καὶ ψυχρόν, ὅταν μὲν ἁπλῶς ᾖ θάτερον ἐντελεχείᾳ, δυνάμει θάτερον ἔσται· ὅταν δὲ μὴ παντελῶς, ἀλλ' ὡς μὲν θερμὸν ψυχρόν, ὡς δὲ ψυχρὸν θερμὸν διὰ τὸ μιγνύμενα φθείρειν τὰς ὑπεροχὰς ἀλλήλων, τότε οὔθ' ἡ ὕλη ἔσται οὔτε ἐκείνων τῶν ἐναντίων ἑκάτερον ἐντελεχείᾳ ἁπλῶς, ἀλλὰ μεταξύ· κατὰ δὲ τὸ δυνάμει μᾶλλον εἶναι θερμὸν ἢ ψυχρὸν ἢ τοὐναντίον, κατὰ τοῦτον τὸν λόγον διπλασίως θερμὸν δυνάμει ἢ ψυχρόν, ἢ τριπλασίως, ἢ κατ' ἄλλον τρόπον τοιοῦτον. Ἔσται δὴ μιχθέντων τἆλλ' ἐκ τῶν ἐναντίων ἢ τῶν στοιχείων, καὶ τὰ στοιχεῖα ἐξ ἐκείνων δυνάμει πως ὄντων, οὐχ οὕτω δὲ ὡς ἡ ὕλη, ἀλλὰ τὸν εἰρημένον τρόπον· καὶ ἔστιν οὕτω μὲν μίξις, ἐκείνως δὲ ὕλη τὸ γινόμενον. Ἐπεὶ δὲ καὶ πάσχει τἀναντία κατὰ τὸν ἐν τοῖς πρώτοις διορισμόν· ἔστι γὰρ τὸ ἐνεργείᾳ θερμὸν δυνάμει ψυχρὸν καὶ τὸ ἐνεργείᾳ ψυχρὸν δυνάμει θερμόν, ὥστε ἐὰν μὴ ἰσάζῃ, μεταβάλλει εἰς ἄλληλα· ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων ἐναντίων. Καὶ πρῶτον οὕτω τὰ στοιχεῖα μεταβάλλει, ἐκ δὲ τούτων σάρκες καὶ ὀστᾶ καὶ τὰ τοιαῦτα, τοῦ μὲν θερμοῦ γινομένου ψυχροῦ, τοῦ δὲ ψυχροῦ θερμοῦ, ὅταν πρὸς τὸ μέσον ἔλθῃ· ἐνταῦθα γὰρ οὐδέτερον, τὸ δὲ μέσον πολὺ καὶ οὐκ ἀδιαίρετον. Ὁμοίως δὲ καὶ τὸ ξηρὸν καὶ ὑγρὸν καὶ τὰ τοιαῦτα κατὰ μεσότητα ποιοῦσι σάρκα καὶ ὀστοῦν καὶ τἆλλα."

29. Cf. *Categoriae*, 10, 12a9-25, *Metaphysica*, X.7. These are the ἔμμεσα ἐναντία of the later tradition.

30. "They" here refers to two qualities on the same scale, e.g. the hotness in fire and in air, or the hotness in fire and the coldness in earth. When fire and air, or fire and earth combine a mean is reached between the different degrees of temperature. Note that for Aristotle the difference

mixed. The presence or absence of a certain balance between the primary qualities (on the same range) determines whether transformation or mixture occurs, as we already saw in the account of mixture. In short, both the transformation and the mixture of the elements depend on changes of the primary qualities.

At the same time the important distinction between mixture and generation & corruption is maintained because they are caused by different kinds of change of the primary qualities. What is more, since we are dealing with qualitative changes, mixture consists in a genuine change (against 1) which is not fatal to the nature of the mixables (against 2 and 3).[31] Since by definition mixture occurs when the qualitative changes are such as not to cause a transformation of the elements, the elements are preserved in the mixture. Finally, though in the initial argument of *De generatione et corruptione* I.10 the term "alteration" remained ambiguous, it now turns out that the final statement "mixture is the unification of mixables when altered" can be evaluated on Aristotle's terms: the mixables are unified as the result of a particular kind of *qualitative* change.[32]

Apart from the potentialities of the qualities to change into either their opposites or an intermediate degree, Aristotle seems to refer to the kind of potentiality he discussed in *De generatione et corruptione* I.10 (§2). Moreover, he claims that an homeomerous mixture is in potentiality the elements in this sense. Apparently, he does not feel the need to distinguish between this kind of potentiality as a mode of being of the ingredients in the mixture, and the potentiality of the mixture to yield the ingredients when analysed.[33]

We may conclude that the distinction between the forms and the qualities of the ingredients that we found in Zabarella has a basis in Aristotle's two-tiered discussion of mixture in *De generatione et corruptione* I.10 and *De generatione et corruptione* II.7. The problem of how to connect the two accounts raises a plethora of questions. Does Aristotle *reduce* mixture to the mutual blunting of the elementary qualities, and, hence, does he *reduce* the potentiality of the ingredients to the potentiality of the elementary qualities? If so, does this apply in all cases, or merely when the elements are concerned as in *De generatione et corruptione* II.7? Does the potentiality of the *ingredients* consist in the potentiality of their *forms*, although Aristotle does not mention the latter even once? If so, is the potentiality of the ingredients to be explained in terms of their

between these opposites is relative to our sense of touch (*De anima*, II.11 424a2-7). In reality there is one range of temperature.

31. It is a burning question whether it is convincing to regard a change in constitutive qualities as a merely qualitative change, but an exploration of this problem in Aristotle's view exceeds the limits of this paper. Here I am only concerned to show how Aristotle may have conceived of his solution judging from the two major texts used by the later tradition.
32. The question how Aristotle could believe that such qualitative changes caused the unification and separation of mixables will have to remain open here.
33. Cf. n. 19.

being "blunted" as in the case of the qualities? Are the qualities of the elements *constitutive* of their essence and form? These and other questions Aristotle left for his commentators to ponder.

## Philoponus[34]

In his introduction to the first part of *De generatione et corruptione* I.10 Philoponus duly summarises the problem Aristotle has to face: in a mixture either both ingredients are preserved, or they both perish, or one is preserved while the other perishes. As Philoponus will note further on in his textual commentary (*In De generatione et corruptione* $189^{10\text{-}17}$), this aporia demands a proper distinction between generation & corruption, and mixture. He states that Aristotle solves the problem by means of the distinction between potentiality and actuality (*In De generatione et corruptione* $188^{14\text{-}15}$) which he goes on to explain in the following way:

1. In mixed wine both the water and the wine exist in potentiality. This is neither according to the first sense [of potentiality], i.e. in terms of suitability (ἐπιτηδειότης) as water is air in potentiality; nor according to the second sense without qualification, i.e. in terms of mere disposition (ἕξις), like the sleeping geometer.
2. But both the water and the wine are disposed in the mixture in the way in which a geometer who is drunk and trying to do geometry is in actuality with respect to disposition, though not purely. For each is actual in the mixture in a tempered mode (κεκολασμένως ἐνεργεῖ). So in this way both are preserved in potentiality though neither is preserved in actuality as it was originally. For their pure actuality has been tempered, and is not as it was before they were mixed.
3. In this way, then, we shall escape all difficulties.[35]

In an attempt to locate the relevant kind of potentiality in Aristotle's philosophy Philoponus resorts to a comparison with the two kinds of potentiality that Aristotle distinguished in *De anima* II.5 in relation to both sense perception and knowledge.[36] A human being has *first* potentiality for knowledge when he

34. Philoponus' main comments on mixture were already translated into German by Böhm, *Ausgewählte Schriften*, pp. 283-299 with extensive notes on their influence in Arabic and Medieval thought, *ibid.*, pp. 450-454, which in effect summarise the pioneering results of Maier, *An der Grenze*, Part I: "Die Struktur der materiellen Substanz." A full English translation with notes of Philoponus' *In De generatione et corruptione* is forthcoming in the series Ancient Commentaries on Aristotle edited by Richard Sorabji, London.

35. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. $188^{16\text{-}26}$: "ἔστι γὰρ ἐν τῷ κεκραμένῳ οἴνῳ δυνάμει καὶ τὸ ὕδωρ καὶ ὁ οἶνος, δυνάμει δὲ οὐ κατὰ τὸ πρότερον, τὸ κατὰ τὴν ἐπιτηδειότητα λέγω, ὡς ἔστι τὸ ὕδωρ δυνάμει ἀήρ, ἀλλ' οὐδὲ ἁπλῶς κατὰ τὸ δεύτερον, τὸ κατὰ τὴν ἕξιν μόνην λέγω, ὥσπερ ἔχει ὁ καθεύδων γεωμέτρης. ἀλλ' ὃν τρόπον ὁ μεθύων γεωμέτρης καὶ ἐπιχειρῶν γεωμετρεῖν ἐνεργεῖ μὲν κατὰ τὴν ἕξιν, οὐκ εἰλικρινῶς δέ, οὕτως καὶ τὸ ὕδωρ καὶ ὁ οἶνος ἔχει ἐν τῷ κράματι· ἑκάτερος γὰρ ἐν τῇ μίξει κεκολασμένως ἐνεργεῖ. οὕτω μὲν οὖν δυνάμει ἀμφότερα σῴζεται, ἐνεργείᾳ δὲ οὐδέτερον οἷον ἦν ἐξ ἀρχῆς· κεκόλασται γὰρ ἡ αὐτῶν εἰλικρινὴς ἐνέργεια, καὶ οὐκ ἔστιν οἵαπερ ἦν πρὶν μιχθῆναι. οὕτως οὖν ἐκφευξόμεθα πάσας τὰς ἀπορίας."

36. More detail is provided in a parallel passage in the *theoria* to *De generatione et corruptione*, II.7, p. $271^{1\text{-}24}$, to which I refer in the following notes and p. 32.

is born, simply because as a human being he has a soul which is naturally disposed to acquire knowledge.[37] Aristotle notes that we say that someone can see or hear even when he is asleep (*De anima* 417a11). Apparently, the potentiality is preserved even when physical causes prohibit its actualisation. In the physical context of mixture Philoponus uses the example of the transformation of water into air to illustrate first potentiality: water may turn into air (§1).

A human being who has acquired knowledge of a particular field (which is first actuality or disposition, ἕξις), e.g. a geometer or a grammarian, has *second* potentiality for knowledge. He is able to use the knowledge he possesses and to apply it to a particular case whenever he wishes, external circumstances permitting. A sleeping geometer does not lose his knowledge; he is merely incapable of using it until he wakes up.[38]

Philoponus claims that the potentiality of mixed ingredients is different from both first and second potentiality (§2). For although mixed ingredients retain their actuality (ἕξις) in the mixture, they do so in a reduced or tempered mode (κεκολασμένως).[39] This reduced actuality constitutes a separate type of potentiality,[40] viz. the potentiality to recover the previous purity of actuality. In the sequel Philoponus explains what actuality he has in mind: it is the actuality of the essential form of the ingredients.[41] Water and wine do not perish but continue to exist, and hence their actuality or form is not lost. Nevertheless, the mixture does affect them in that their actuality or form is somehow tempered.[42]

37. Cf. Aristoteles, *Analytica priora*, II.19 100a13-14: "ἡ δὲ ψυχὴ ὑπάρχει τοιαύτη οὖσα οἵα δύνασθαι πάσχειν τοῦτο."
38. Cf. Aristoteles, *Physica*, VII.3 247b13-16. Philoponus also regards sleep as an impediment, see *In De generatione et corruptione*, p. 271$^{7-10}$; however, contrary to Aristotle he seems to identify second potentiality with the state of a sleeping builder, or a builder who cannot apply his knowledge because he does not have the proper building materials.
39. Cf. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 198$^{26-27}$: "οὐ μὴν πάντῃ φθείρει, ἀλλὰ τὰς ὑπερβολὰς κολάζει μόνον." See also p. 198$^{21-23}$: if a drop of wine is mixed with an increasing amount of water, first the quality is blunted, and finally it changes completely (ἡ ποιότης ἀμβλύνηται, τέλος καὶ παντελῶς μεταβάλλει). For the quality see also p. 202$^{12-13}$ and below p. 33.
40. Here Philoponus seems to speak of a qualified instance of the second type, whereas in p. 271$^{14, 16}$ he considers it as an independent meaning of the term "in potentiality," ἕτερόν τί τοῦ δυνάμει σημαινόμενον, which is to be located between first and second potentiality (271$^{18}$); see below p. 32.
41. Cf. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 191$^{26-28}$: " ... τοῦτό φησιν ὅτι πέφυκε τὰ κεκραμένα, διὰ τὸ μὴ τὸ τέλειον εἶδος ἀπολέσαι ἀλλὰ μόνον τὸ εἰλικρινές, διά τινων διακριτικῶν τε καὶ ἀλλοιωτικῶν ὀργάνων ὁλόκληρον πάλιν τὸ οἰκεῖον εἶδος ἀπολαβεῖν." (" ... [Aristotle] means that mixed ingredients are naturally disposed to wholly recover their own form by means of certain analytic tools that cause alteration, because they have not lost their complete form but only its purity"); cf. p. 192$^{11-14}$, esp. 12: "αὐτὰ τὰ εἴδη κεκολασμένα."
42. Here we encounter the famous issue of the latitude of forms which I have to leave aside here. In discussing the fourteenth century Oxford Calculators Sylla, "Medieval Concepts," p. 227, n. 10 already noted the presence of this theory in Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 170$^{12}$ but it is widely spread in both

The example of the drunken geometer (§2) explains the character of this third kind of potentiality.[43] Unlike the sleeping geometer (§1), a drunken geometer may still try to use the knowledge he possesses. However, the intoxication affects the disposition of the geometer and keeps him from reaching full second actuality (i.e. a successful application of geometrical knowledge). This example concerning *second* actuality ($188^{21-23}$) serves to introduce the notion of temperation which Philoponus then applies to the *first* actuality ($188^{23-26}$) by which the ingredients exist in a mixture. For in a later passage Philoponus locates the corresponding type of potentiality on a range *between first and second potentiality* ($271^{14-24}$, see below). This location seems to rule out that the tempered second actuality of the drunk geometer, which is to be located between second potentiality and second actuality, is itself an illustration of the mode of being of the ingredients in a mixture. As the later passage makes clear ($271^{11-14}$), their mode of being is conceived as a kind of *potentiality* between existence and non-existence, not between degrees of second *actuality*.

This solution meets all requirements of the argument in *De generatione et corruptione* I.10: generation & corruption are avoided; mixing somehow affects the ingredients; the mixed ingredients have an equal status in the mixture; they both exist "in potentiality." Hence Philoponus triumphantly concludes that hesitation concerning the obvious reality of mixture is removed and plain experience is vindicated ($188^{30-33}$).

In the *theoria* to *De generatione et corruptione* II.7 Philoponus provides further details concerning his third type of potentiality ($271^{14-24}$). It should be located on a range between first and second potentiality as its extremes. He compares it with the ontological status of a house in the process of being built: it is not a house in potentiality as are the bricks and wood (i.e. first potentiality), nor — we should add — a complete house ready to serve as shelter (second potentiality). Again, sperm is a human being in potentiality in a different sense from an embryo that is being formed. Again, a newborn baby is a grammarian in a different sense from a child that has the proper age to learn grammar, or a child that is being taught grammar. There is a wide range (πλάτος πολύ) in these cases because one state is closer to the form, another further away from it. They confirm the existence of a range of potentiality and thus create room for the third sense of "in potentiality."[44]

Philoponus and other Neoplatonists. See further Croese, *Simplicius*, pp. 82-84 and my paper "More and Less," in preparation.

43. Philoponus uses the same kind of potentiality and the same example to explain Platonic recollection in Aristotelian terms in *Commentaire sur le De anima d'Aristote* (Verbeke), p. $39^{1-20}$ (= *De intellectu*). For this and other applications of the third type of potentiality see my paper "Recollection," forthcoming.

44. Cf. Aristoteles, *De generatione animalium*, II.1 735a4-15. Of course this range is to be distinguished from the range of the hot, cold, wet, and dry mentioned by Aristoteles, *De generatione et corruptione*, II.7 334b28, which explains how different kinds of mixture can arise from a

Unlike Aristotle, Philoponus already brings the qualities of the ingredients into play in the context of *De generatione et corruptione* I.10. He implies that the process of mixing consists in a blunting of the *quality* (198[22-23]); he states that mixing occurs because the mixables act and are acted on with respect to *quality* (202[12-13]). Finally, he seems to reduce the potential existence of the *ingredients* to the tempered mode of their characteristic *qualities*. Likewise, each ingredient needs an addition (προσθήκη) with respect to its own quality in order to become in actuality what it was beforehand — which, we are told, is not a full-scale change entailing generation & corruption (202[21-25]).[45]

When commenting on the final sentence of *De generatione et corruptione* I.10, Aristotle's definition of mixture, Philoponus makes a careful attempt to connect *De generatione et corruptione* I.10 and II.7 into a single description of mixture:

> This can be the definition of mixture, "unification of the mixables through alteration," because the things mixed are preserved in one way but perish in another. For, as was said, they are not such-and-such in actuality, but having been tempered they appear to have perished, and they no longer preserve the perfection of such-and-such a form. On the other hand they remain and are preserved in this way that their qualities have not changed entirely but their unity remains.[46]

The ingredients appear to have perished because their *form* has lost its perfection in that it is reduced to a tempered mode of being. In reality, the ingredients remain because their distinctive *qualities* have not changed entirely but continue to exist in a unified mode.

It is to be noted that this interpretation is reflected in a slight though perhaps significant change in the wording of Aristotle's definition. "Mixture is the unification of mixables *that have been altered* [ἀλλοιωθέντων]" in the lemma (203[8]) is rephrased as "mixture is the unification of the mixables *through alteration* [δι' ἀλλοιώσεως]" in the commentary (203[11]). The latter phrase leaves open the possibility to distinguish between a non-qualitative change of the ingredients as such (i.e. the loss of perfection of their essential form) and a concomitant change of their qualities (i.e. their "blunting" so as to form a new unity). Moreover, the latter phrase more clearly distinguishes mixture from alteration, which may be a necessary part of, or preparation to mixture, but not all that the process of

mixture of the same four elements in different ratios. For Philoponus' comments on *this* range, see the *theoria*, p. 272[12-33], and the textual commentary, p. 274[21] ff.

45. The vocabulary of this passage is very close to Alexander Aphrodisiensis, *De mixtione* (Bruns), p. 231[16-22], see below p. 38-40. These lemmata may be indebted to Alexander's lost commentary on *De generatione et corruptione*, I.10 even though he is not mentioned explicitly.

46. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 203[10-16]: "καὶ ὁ λόγος ἂν οὗτος εἴη μίξεως 'ἕνωσις τῶν μικτῶν δι' ἀλλοιώσεως,' ὡς πῇ μὲν σῴζεσθαι τὰ μιγνύμενα πῇ δὲ φθείρεσθαι, ἐνεργείᾳ μὲν οὐκ ὄντα τοιαῦτα, ὡς εἴρηται, ἀλλὰ κεκολασμένα ἐφθάρθαι δοκεῖ, μηκέτι τὴν ἀκρότητα τοῦ τοιούτου σῴζοντα εἴδους, τῷ δὲ μὴ καθ' ὅλας αὐτὰς μεταβεβληκέναι τὰς ποιότητας, ἀλλ' ἕνωσιν ὑπομεῖναι τούτων, ταύτῃ ὑπομένει καὶ σῴζεται."

mixing consists in. Mixture is to be distinguished from mere alteration as much as from generation & corruption.[47]

So far we may conclude that our commentator sees the need to combine *De generatione et corruptione* I.10 and II.7. He reduces the potentiality of the ingredients to a reduced status of their forms, which explains their apparent corruption. At the same time the qualities of the ingredients are blunted so as to constitute a new unity. In this way the ingredients are preserved.

However, this is not Philoponus' final word on the issue. In the footsteps of Aristotle he returns to the topic of mixture in his *theoria* and commentary on *De generatione et corruptione* II.7. In this context the ingredients are the four elements, which constitute the primary mixtures, i.e. homeomerous substances like bile, blood, bone, and flesh. Philoponus identifies Aristotle's solution to the problem of *De generatione et corruptione* II.7 as the solution of *De generatione et corruptione* I.10 ($270^{16-18}$) which he describes at length in its application to fire and the four elementary qualities ($270^{18}$-$271^{2}$). As the form of fire is not preserved in purity, so the highest degree of each quality is lost in the composite. As the pure form of fire remains in potentiality, so does the highest degree of each quality.[48] Then he lists the three senses of "potentiality" discussed above ($271^{2-24}$, see p. 30-32). So far, so good.

At this point, however, Philoponus draws attention to the essential relation between fire and the highest degree of hotness, which implies that the preservation of fire and the reduction of hotness are irreconcilable.

1. So this [i.e. the account summarised above] is obvious, but one must know the following which is worthwhile remarking. For someone will say that if we say that the purely hot has not perished qua hot but it has perished qua *purely* hot, we can no longer say that fire too has perished qua *pure* fire but not qua fire as such. For if fire insofar as it is fire is seen as maximally and purely hot (fire qua fire is not hot in relation to one thing and cold to another but maximally hot) — if, then, you say that the maximally hot qua maximally hot has perished, and fire qua fire is maximally hot, it is clear that fire insofar as it is fire has perished in the compound. Moreover, it will be true to say that fire insofar as it is fire has *completely* perished, but the hot qua hot has not perished *without qualification*, but [only] qua *maximally* hot.
2. And this is reasonable. For it is not the same to say "hot" and "fire," since it is not the case that if something is hot, it is fire, but if something is *maximally* hot, it is fire, and if something is fire, it is *maximally* hot. If fire qua fire has completely perished, it is clear that the compound is fire in potentiality according to the first sense of "in potentiality," according to which we also say that matter is fire in potentiality. The compound does not possess anything of fire in virtue of which [fire] is fire.

47. For the need to distinguish mixture from alteration cf. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), 327b14, p. $190^{15-21}$; 327b27, p. $192^{4-8}$. On the status of alteration as a necessary part of a different kind of change see *Physica*, VII.3 and Croese, *Simplicius*, ch. 6 for its reception by Simplicius.
48. From Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), pp. $277^{27}$-$278^{2}$ it is clear that this description applies to all qualities whether constitutive of substances or not.

3. However, what has been stated earlier remains true of the hot. Since it has perished qua maximally hot but not qua hot without qualification, it is reasonable that the compound is not called maximally hot in potentiality according to the first sense of "in potentiality," but it will be called thus according to the distinctions made above.[49]

Philoponus makes perfectly clear that if the elements are essentially characterised by hot, cold, moist, and dry *to the highest degree*, they cease to exist the moment a change of degree in these qualities occurs.[50] If the compound no longer possesses anything distinctive of fire, it is no longer fire in potentiality in the third sense of potentiality; first potentiality now suffices. Yet, the third sense of potentiality still applies to the qualities themselves inasmuch as they may regain their highest degree once it is lost.

How are we now to interpret the commentary on *De generatione et corruptione* I.10? Is it perhaps an earlier stratum of the commentary, to be overruled by this later insight which was prompted by an objection not envisaged before?[51] I believe not: in the textual commentary on *De generatione et corruptione* II.7 334b18 ff. it becomes clear that the commentary on *De generatione et corruptione* I.10 should be regarded as a faithful account of what Philoponus believes

49. *Ibid.*, pp. $271^{25}$-$272^{10}$: "Τοῦτο μὲν οὖν προφανές, ἐκεῖνο δὲ πάλιν ἰστέον ὅπερ ἐπιστάσεώς ἐστιν ἄξιον. ἴσως γάρ τις ἐρεῖ ὅτι εἰ λέγομεν τὸ εἰλικρινὲς θερμὸν ὡς μὲν θερμὸν μὴ ἐφθάρθαι ὡς δὲ εἰλικρινὲς θερμὸν ἐφθάρθαι, οὐκέτι δυνάμεθα καὶ τὸ πῦρ λέγειν ὡς μὲν εἰλικρινὲς πῦρ ἐφθάρθαι ὡς δὲ πῦρ ἁπλῶς μὴ ἐφθάρθαι. εἰ γὰρ τὸ πῦρ ἢ πῦρ ἐστι κατὰ τὸ ἄκρον καὶ εἰλικρινὲς θερμὸν θεωρεῖται (οὐ γάρ ἐστι τὸ πῦρ ἢ πῦρ πρὸς ἄλλο μὲν θερμὸν πρὸς ἄλλο δὲ ψυχρόν, ἀλλ' ἄκρως θερμόν), εἰ τοίνυν λέγεις τὸ ἄκρον θερμὸν ὡς ἄκρον θερμὸν ἐφθάρθαι, ἔστι δὲ τὸ πῦρ ἢ πῦρ ἄκρον θερμόν, δῆλον ὅτι τὸ πῦρ ἢ πῦρ ἐστιν ἔφθαρται ἐν τῷ συνθέτῳ· καὶ ἔσται ἀληθὲς τὸ λέγειν τὸ μὲν πῦρ ἢ πῦρ ἐστι καθάπαξ ἐφθάρθαι, τὸ δὲ θερμὸν ἢ μὲν θερμὸν ἁπλῶς μὴ ἐφθάρθαι, ἢ δὲ ἄκρον θερμὸν ἐφθάρθαι. καὶ τοῦτο εὐλόγως. οὐ γὰρ ταὐτὸν θερμὸν εἰπεῖν καὶ πῦρ· οὐ γὰρ εἴ τι θερμόν, τοῦτο πῦρ ἐστιν, ἀλλ' εἴ τι ἄκρως θερμόν, τοῦτό ἐστι πῦρ, καὶ εἴ τι πῦρ ἐστι, τοῦτο ἄκρως ἐστὶ θερμόν. εἰ δὲ καθάπαξ τὸ πῦρ ἢ πῦρ ἔφθαρται, δῆλον ὅτι τὸ σύνθετον δυνάμει ἔσται πῦρ κατὰ τὸ πρῶτον σημαινόμενον τοῦ δυνάμει, καθ' ὃ καὶ τὴν ὕλην φαμὲν δυνάμει εἶναι πῦρ· οὐδὲν γὰρ τοῦ πυρὸς καθ' ὃ πῦρ ἐστιν ἔχει τὸ σύνθετον. ἐπὶ μέντοι τοῦ θερμοῦ σῴζεται ἀληθῆ τὰ προειρημένα. ἐπειδὴ γὰρ ὡς μὲν ἄκρον θερμὸν ἔφθαρται ὡς δὲ ἁπλῶς θερμὸν οὐκ ἔφθαρται, εὔλογον μὴ κατὰ τὸ πρῶτον σημαινόμενον τοῦ δυνάμει λέγεσθαι τὸ σύνθετον δυνάμει εἶναι ἄκρως θερμόν, ἀλλὰ λεχθήσεται κατὰ τὰ ἀνωτέρω διωρισμένα."

50. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), comm. 90 uses the same argument to the same effect. However, Averroes, *Commentaria in Aristotelis De caelo* (Venezia, 1562 – 1574). comm. 67 uses the argument to defend why it cannot be said that the elements remain *perfectly* in the mixture. He goes so far as to compare their ontological status to an intermediate state between substance and accident: "formae istorum elementorum substantiales sunt diminutae a formis substantialibus perfectis et quasi suum esse est medium inter formas et accidentia."

51. A further complication is that Philoponus' *In De generatione et corruptione* is a report of Ammonius' teachings "together with a number of remarks [ἐπιστάσεις] of his own" (*In De generatione et corruptione*, p. $1^{1-5}$). It is conceivable that Ammonius relied on Alexander for most of his account, and that Philoponus added this criticism as a consideration of his own. The passage Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), pp. $271^{26}$ ff. is emphatically introduced as "a worthwhile remark someone might make." Alternatively, the remark may simply derive from Ammonius' lectures.

to be *Aristotle's* theory of mixture,[52] although *Philoponus* himself wishes to restrict the application of third potentiality to qualities alone.

In *De generatione et corruptione* II.7 334b18-19 Aristotle stated that the compounds are "in some way ⟨the elements⟩ in potentiality, not in the same way as matter but in the way we have explained" (translated above p. 27-28). We already saw that this passage takes up the notion of potentiality used in *De generatione et corruptione* I.10. Philoponus provides two explanations of the difference this sentence indicates. The second is most interesting for our present concerns. He explains the difference in terms of the different senses of "in potentiality":

1. However, perhaps one will provide a more natural interpretation of the phrase "the compound is not the simple [elements] in potentiality in the same way as matter is" when one points to that difference between the senses that we have also mentioned above in the *theoria*. The difference is this: matter is said to be the simple [elements] in potentiality without possessing any trace of their form, which is the first sense of "in potentiality," but not so the compound. For it already has something of the form of the simple [elements] even though their purity has perished. This cannot be the case according to the first sense of "in potentiality."
2. Moreover one must point out the following, viz. that if Aristotle says that matter and compounds are not said to be the simple [elements] in potentiality in the same sense, he necessarily believes that fire and the other [elements] have not perished completely qua fire in the compound, but qua *pure* fire, and that tempered fire is identical with relative hotness.[53]

From the first paragraph it is clear that Philoponus believes that this interpretation does more justice to Aristotle's allusion to a difference in potentiality. Moreover, from the second paragraph it appears that he believes that Aristotle here alluded to the difference between first and third potentiality. If so, Philoponus is right to bring out the implication that Aristotle must have believed the elements to be present in the compound in a tempered mode. We have already seen that Philoponus agreed with an anonymous objection against Aristotle that

52. In the next section we shall see that it was probably Alexander who introduced the reduction of the forms of the ingredients in the explanation of mixture. If so, Philoponus' restriction is a correction of Alexander's view rather than Aristotle's. In Johannes Philoponus, *De aeternitate mundi contra Proclum* (Rabe), XIII.14, p. 518[17-18] Philoponus also speaks of "tempering the excess of fire" (not heat) in an argument designed to ridicule Aristotle's criticism of Plato's *Timaeus* in *Meteorologica*, I.3 340a1; here we would indeed expect Philoponus to argue on Aristotle's terms.

53. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), p. 276[11-23]: "προσφυέστερον δὲ ἴσως τὸ 'οὐχ οὕτως τὸ σύνθετον δυνάμει ἐστὶ τὰ ἁπλᾶ ὡς ἡ ὕλη' ἐξηγήσεταί τις λέγων ταύτην τὴν διαφορὰν τῶν σημαινομένων, ἣν καὶ ἄνω προειρήκαμεν κατὰ τὴν θεωρίαν. ἡ δὲ διαφορὰ αὕτη ἐστίν, ὅτι ἡ μὲν ὕλη δυνάμει λέγεται εἶναι τὰ ἁπλᾶ μηδὲν ἴχνος ἔχουσα τοῦ εἴδους αὐτῶν, ὅπερ ἐστὶ τὸ πρῶτον σημαινόμενον τοῦ δυνάμει, τὸ δὲ σύνθετον οὐχ οὕτως· ἔχει γὰρ τοῦτό τι τοῦ εἴδους τῶν ἁπλῶν, εἰ καὶ τὸ εἰλικρινὲς αὐτῶν ἔφθαρται, ὅπερ οὐ δύναται εἶναι κατὰ τὸ πρῶτον σημαινόμενον τοῦ δυνάμει. καὶ χρὴ ἐκεῖνο ἐπισημαίνεσθαι ὡς, ἐὰν τοῦτο λέγῃ ὁ Ἀριστοτέλης ὅτι οὐ κατὰ τὸ αὐτὸ σημαινόμενον τοῦ δυνάμει ἥ τε ὕλη δυνάμει λέγεται εἶναι τὰ ἁπλᾶ καὶ τὰ σύνθετα, ἐξ ἀνάγκης τὸ πῦρ καὶ τἆλλα οὐκ οἴεται καθὸ πῦρ τελέως ἐφθάρθαι ἐν τῷ συνθέτῳ, ἀλλὰ καθὸ εἰλικρινὲς πῦρ, τῷ δὲ πρὸς ἕτερον θερμῷ τὸ κεκολασμένον πῦρ ταὐτόν."

fire is only convertible with *the highest degree* of hotness ($271^{25}$-$272^{10}$, see above). Hence we may infer that he knowingly disagrees with (what he believes to be) Aristotle's view.

This interpretation of Philoponus can be confirmed from *In De generatione et corruptione* II.5 $245^{18}$-$246^{1}$ and from later writings. In the former passage Philoponus discusses a rather curious interpretation of the statement "Everything comes to be from fire; hence everything is fire." Some people suggested that everything is fire because while changing into the other elements fire is not destroyed but only loses its purity ($245^{18\text{-}25}$). Philoponus replies that partial loss of the nature of the elements in terms of their qualities (*sic*) is relevant only to the generation of a composite, not to the generation of the simple elements out of each other. For each of the elements has its qualities to the highest degree, unmixed, and untempered. Dry fire cannot remain medium dry after turning into moist air for air is moist *to the highest degree* as fire is dry *to the highest degree*. To avoid the attribution of sheer contradictory qualities the entire nature of fire must change in order to become air ($245^{25}$-$246^{1}$).

In later writings Philoponus holds on to the view of mixture defended in *In De generatione et corruptione* II.7. In *Contra Proclum* XI.14 Philoponus aims at showing that Plato's philosophy is full of contradictions. One of these is that according to *Timaeus* 54b1-d2 the element earth cannot change into any of the other three, whereas from *Timaeus* 42e8-43a2 it follows that all four elements are combined in creating the visible world. Such a composite must be a homeomerous fusion of the elements. Hence, Philoponus concludes, "if none of the elements is present in the composite in actuality, but the form (ἰδέα) of each has perished when they have been mixed and some other form (εἶδος) has supervened upon their mixture and fusion (e.g. the form of flesh or blood), I believe it is clear to everyone that in the composite earth too has changed" (*Contra Proclum* $462^{9\text{-}15}$). Finally, in the *Tractatus de totalitate et partibus* Philoponus stipulates once again that the elements remain potentially in the mixture only in the sense that they may reappear as specifically (not numerically) the same elements when the mixture falls apart, whereas only the qualities of the elements remain in reduced purity.[54]

54. Johannes Philoponus, *Tractatus de totalitate et partibus*, cap. 4, pp. 130-131 (ed. and Latin translation from the Syrian in Šanda, German in Böhm, *Ausgewählte Schriften*, pp. 297-298): "Potentia e.g. sunt in corpore quattuor elementa, aqua, aër, terra, ignis. Iamvero horum substantiae corrumpuntur. Non enim est aqua actu in corporibus compositis neque terra neque ignis neque aër, sed potentia tantum et ita in potentia, ut compositum dissolvi possit in singula illorum iuxta ipsorum speciem, non utique in eadem secundum numerum, ex quibus ab initio constabat. Quomodo enim ea quae iamdudum corrupta sunt iterum fierent? Qualitates autem eorum, i.e. calor, frigiditas, siccitas, humiditas confusionem et mixtionem in composito patiuntur, et propter hoc puritas eorum in diminutione est. [...] Ergo etiam genuinitas qualitatum in compositis corrupta est, solumque igitur in potentia sunt elementa in compositis, quoniam fieri potest ut interdum una ex illis qualitatibus oppositis praevaleat et iterum fiat valde calidum vel frigidum sicut ab initio, nimirum cum compositio resolvitur." Cf. cap. 7, pp. 134-135 (Šanda).

We have seen that Zabarella refers to Philoponus in support of the view that both the forms and the qualities of the ingredients are preserved in reduced actuality. Now we can say that Zabarella was wrong.[55] It seems likely that he only consulted Philoponus' comments on *De generatione et corruptione* I.10 without taking into account the correction Philoponus added in his commentary on *De generatione et corruptione* II.7. Indeed, Zabarella focuses on Philoponus' commentary on *De generatione et corruptione* I.10 for the "third intermediate mode" (472A *tertio modo medio*) of potentiality with respect to the forms of the elements.[56] He does not mention any statement contained in Philoponus *In De generatione et corruptione* II.7! Hence it passed unnoticed that Philoponus himself adhered to the 4th view Zabarella listed, which was to be defended by e.g. Thomas Aquinas: the forms perish but the qualities are preserved in reduced actuality.[57]

## Alexander of Aphrodisias: A Source of Inspiration?

Zabarella mentions Philoponus together with Alexander, and we have seen that the interpretation of Aristotle that Philoponus provides in his comments on *De generatione et corruptione* I.10 contains some echoes of Alexander's *De mixtione*. Hence Alexander deserves closer inspection.

As Todd already noted,[58] Philoponus' commentary is our principal source for Alexander's lost commentary on *De generatione et corruptione* with which our commentator was plainly familiar.[59] Alexander's *De mixtione* Ch. XIII-XV

— In the context of Philoponus' monophysitism it is useful to have mixture as an example of how a new unity may come to be from different elements: so did the unique nature of Christ come to be out of its divine and human components.

55. Böhm, *Ausgewählte Schriften*, p. 452 made the same mistake. In the case of Zabarella this mistake cannot be attributed to the inferiority of the manuscript on which the Aldine edition and its descendants was based (see n. 12). The text of the relevant passages is virtually the same as that of our Berlin edition. In the 1527 Aldine edition, see for *De generatione et corruptione*, I.10, p. 42ab and for *De generatione et corruptione*, II.7, pp. 60ab, 61b; in the 1549 Bagolinus translation, see for *De generatione et corruptione*, I.10 contextus 82 ff., pp. 29a ff.
56. Zabarella, *De mistione*, c. X, 471F-472C paraphrases Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), I.10, p. $188^{17-25}$ = contextus 82, containing the contrast between the sleeping and drunken geometer, p. $191^{26-27}$ = contextus 84, and p. $198^{24-30}$ = contextus 89; see above p. 23.
57. Among recent commentators Eric Lewis also understands Aristotle in this way. See Alexander of Aphrodisias, *On Aristotle Meteorology 4*, p. 44: "The *potential* existence of a constituent in a compound is grounded by the *actual* existence of the chemical powers which constitute the constituents." To him Aristotle's motive was: "If [the elements] existed actually they would actually move towards their natural places, yielding the dissolution of the compound. So they exist, but potentially" (p. 43).
58. *Alexander of Aphrodisias on Stoic Physics* (Todd), pp. 251-252.
59. Philoponus often refers to Alexander *In De generatione et corruptione*, otherwise lost in Greek. Recently Gannagé, "Alexandre d'Aphrodise," has published fragments of Alexander *In De generatione et corruptione*, II.2-5 in Arabic, embedded in an extensive commentary on Aristotle's *De generatione et corruptione*, II.2-6 transmitted under the name of the 8th century Arabic alchimist Gabir ben Hayyan but probably dating from the 9th-10th century AD.

is a restatement of Aristotle's theory of mixture that may derive from the lost commentary although it has been restructured to fit the purpose of the anti-Stoic treatise. At *De mixtione* XV 232[24-32] Alexander explains that the ingredients of a proper mixture do not remain the same in form as they do in apparent mixtures:

> 1. In these cases [i.e. apparent mixtures] the residue after the dissociation stays the same in form as before and is only decreased in quantity, but with the bodies that have been blended the difference is that each of the things in potentiality in the body produced from the blend is separated out, changing into the perfection (τελειότης) of which it was deprived through the process of balanced reciprocal interaction; and because of this characteristic "being separated" (χωρίζεσθαι) is also predicated of these bodies.
> 2. So if it is reasonable to describe the bodies perfected (τελειούμενα) by such a change not as "coming to be" but as "being separated," and if the other statements made about the process of blending follow our basic principles are consonant with how bodies change and come to be, and preserve the common preconceptions about blending, only Aristotle will have propounded the true theory of blending.[60] (tr. Todd *o.c.* 159, modified)

For Alexander, blending and separation become a special kind of change "between" generation and alteration. As such, it is a rather awkward intermediate between a change in substance and a change in quality. According to Alexander separation of the ingredients of a mixture is the result of restoring the perfection that was lost through qualitative interaction during the process of mixing. Earlier at *De mixtione* XV 231[16-22] Alexander had couched the same change in terms of the preservation of the ingredients in potentiality, with a corresponding loss of actuality. To restore them to their perfection requires "just slight assistance," and "some addition" which is not a full generation or change.[61] All in all this account compares well with the form's loss of purity and actuality

— In the context of mixture an indication of Alexander's influence is Philoponus' tendency to restrict the phenomenon of mixture to particular kinds of liquids: compare Alexander, *De mixtione*, VIII *passim* (see *Alexander of Aphrodisias on Stoic Physics* [Todd], p. 204), XIII, pp. 228[36]-229[3], XIV, pp. 230[34]-231[4], 231[12-13] with Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), pp. 200[19-23], 200[30]-201[5], 202[16-18]; only at p. 200[25-27] does Philoponus preserve Aristotle's perspective (328a33-b5) that liquids mix *most easily*. In the context of Alexander's polemic against Stoicism a denial of the universality of mixture served to deny the universal validity of the Stoic theory of blending. For Alexander's introduction of the reduction of the form see the main text.

60. Alexander Aphrodisiensis, *De mixtione* (Bruns), XV, pp. 232[26]-233[2]: "ἐπὶ μὲν γὰρ τούτων ταὐτὸν κατὰ τὸ εἶδος μένει μετὰ τὴν ἀπόκρισιν τὸ ὑπομένον τῷ πρὸ τοῦ, μόνον κατὰ ποσὸν ἐλαττούμενον, ἐπὶ δὲ τῶν κεκραμένων οὐχ ὁμοίως, τῷ ἕκαστον τῶν ὄντων δυνάμει ἐν τῷ ἐκ τοῦ κράματος γεγονότι σώματι ἐκκρίνασθαι, μεταβάλλον εἰς τὴν τελειότητα, ἧς ἀφῃρέθη διὰ τοῦ ἐπ' ἴσης αὐτὰ ἀντιπαθεῖν ὑπ' ἀλλήλων, δι' ὃ πάθος καὶ ἐπὶ τούτων τὸ χωρίζεσθαι κατηγορεῖται. εἰ οὖν τά τε διὰ τῆς τοιαύτης μεταβολῆς τελειούμενα οὐ γενέσθαι, ἀλλὰ χωρίζεσθαι λέγειν εὔλογον, τά τε ἄλλα περὶ τῆς γενέσεως τῆς κράσεως εἰρημένα ἀκόλουθά τε ταῖς ὑποκειμέναις ἀρχαῖς καὶ συνῳδὰ ταῖς μεταβολαῖς τε καὶ γενέσεσι τῶν σωμάτων καὶ σώζοντα τὰς περὶ τῆς κράσεως κοινὰς προλήψεις, μόνος Ἀριστοτέλης εἴη ἂν τὸν ἀληθῆ περὶ τῆς κράσεως ἀποδεδωκὼς λόγον." Todd's translation obscures the similarity between Alexander and Philoponus by translating τελειότης, τελειούμενα as "actuality, being actualised' (see also p. 231[21-22]); but see his notes to p. 231[21-22] (*Alexander of Aphrodisias on Stoic Physics*. p. 240), and p. 232[29] (*o.c.*, p. 242).

61. Alexander, *De mixtione*, XV, p. 231[22-29] also makes the important point that the recovered ingredients are only specifically, not numerically, identical with the original ingredients. In

as described by Philoponus in his comments on *De generatione et corruptione* I.10,[62] although we have seen that he is more explicit about the ontological status of the ingredients in the mixture than Alexander.[63] The conclusion seems warranted that the view Philoponus sets out and later rejects is at least partly due to Alexander. Although he was surely aware of this debt to Alexander, he considers the commentator as a faithful expounder of Aristotle to such extent that he presents his (implied) rejection of the view that forms persist in reduced actuality as a rejection of Aristotle's, not Alexander's, view (cf. $276^{18\text{-}23}$).

## A Neoplatonic Alternative to Philoponus: Proclus and Simplicius

Philoponus' view of Aristotle's theory of mixture is relatively moderate when compared to his fellow Neoplatonists Proclus and Simplicius. Both Proclus and Simplicius revive a neo-Aristotelian interpretation of *De generatione et corruptione* I.10 already mentioned (not supported) in Galen, Stobaeus and Plotinus.[64] On this interpretation of mixture the bodies of the ingredients remain juxtaposed, while only the qualities mix. With this interpretation in hand Proclus and Simplicius reject Aristotle's notion of mixture as part of the defence of Plato's theory of triangles of the *Timaeus* against Aristotle's attack in *De caelo* 306a1-307b24 which they read in the interpretation of Alexander. Let us study this complex situation somewhat further.

One of Aristotle's fifteen arguments against Plato's theory of triangles aimed at showing that combinations (συνθέσεις) of atomic triangles or Democritean

*De mixtione*, XV, pp. $231^{30}$-$232^{18}$ Alexander describes a number of illustrations of his theory. Philoponus mentions specific recovery only in the *Tractatus de totalitate et partibus* (Šanda), pp. 130-131 (German in Böhm, *Ausgewählte Schriften*, pp. 297), as quoted in note 54 above.

62. A similar terminology with regard to the mixing of qualities is found in Plotinus, *Enneades*, II.7 [37], p. $2^{22\text{-}25}$: "Ποιότης μὲν γὰρ ποιότητι συνελθοῦσα οὐκ ἐκείνη οὖσα, ἀλλὰ μετ' ἄλλης, ἐν τῷ μετ' ἄλλης εἶναι οὐ καθαρὰ οὖσα οὐκ ἔστι παντελῶς ἐκείνη, ἀλλὰ ἠμαύρωται [...]": "When quality comes together with quality it is not that quality which it was before, but is associated with another, and, because in that association it is not pure, it is no longer perfectly what it was, but is dimmed" (transl. Armstrong). The verb ἀμαύρω is a hapax in Plotinus.

63. On Alexander's reticence in this respect see Todd *o.c.*, p. 240, who refers to Philoponus' drunken geometer as an improvement on Alexander.

64. Galenus, *In Hippocratis de Natura Hominum*, vol. 15, p. $32^{1\text{-}11}$ Kuhn (= *Stoicorum veterum fragmenta* [von Arnim], 2.463): "ὅτι γὰρ οὐχ ἕν ἐστιν, ἀλλὰ πλείω τὰ συντιθέντα τὴν τοῦ ἀνθρώπου φύσιν, ἐπιδείκνυσιν ὁ Ἱπποκράτης, οὐ μὴν ὅτι γε μηδέν ἐστι τῶν τεττάρων στοιχείων εἰλικρινὲς ἐν τῷ σώματι. τὴν ἀρχὴν γὰρ οὐδὲ λέγουσιν οἱ τῆς δόξης ταύτης ἡγεμόνες τοῦτο. ἓν δή τι παρὰ τὰ τέτταρα, τὸ ἐξ αὐτῶν συγκείμενον, ἀποφαίνονται, ὥς γε τὴν τετραφάρμακον δύναμιν οὔτε κηρὸν οὔτε πίτταν οὔτε ῥητίνην οὔτε στέαρ, ἀλλά τι παρὰ ταῦτα ἓν ἄλλο, ὃ ἐξ ἁπάντων κραθέντων γέγονεν, οὔσης πάλιν καὶ αὐτῆς ⟨ταύτης⟩ τῆς δόξης διττῆς· ἔνιοι μὲν γὰρ τὰς τέτταρας ποιότητας μόνας κεράννυσθαι δι' ὅλων ἀλλήλαις λέγουσιν, ἔνιοι δὲ τὰς οὐσίας ἀπεφήναντο, Περιπατητικοὶ μὲν τῆς προτέρας δόξης προστάντες, Στωϊκοὶ δὲ τῆς δευτέρας"; Arius Didymus *Epitome*, fr. physica 4 (= *Doxographi graeci* [Diels], 449.1-3 = Stobaeus *Eclogae*, 1.17.2, 1-4) "Ἀριστοτέλους καὶ τῶν ἀπ' αὐτοῦ. Τὰ μὲν σώματά φασι θρυπτόμενα κατὰ μικρὰ μόρια παρατίθεσθαι ἀλλήλοις, τοῖς δ' ἀσωμάτοις λόγοις, εἴ τινές εἰσι λόγοι, συγκιρνᾶσθαι."; cf. Plotinus *Enneades*, II.7 [37], pp. $1^{8\text{-}9}$, $2^{10\text{-}11}$ without attribution. Cf. Sorabji, *Matter, Space and Motion*, p. 72.

atoms fail to constitute the continuous wholes that homeomerous bodies like flesh and bone are believed to be, because mere contact does not constitute continuity. Combination may suffice to constitute the elements, but not continuous bodies; hence generation, which is generation of bodies, is abolished (*De Caelo* 306b22-29).[65] Simplicius reports that Alexander went even further and emphasised that there will always be void between adjacent particles of the elements.[66]

In his *De caelo* commentary ($640^{20}$-$672^{23}$) Simplicius sets out to refute each of Aristotle's 15 arguments on the basis of Proclus' otherwise lost treatise *Investigation of the Objections of Aristotle to Plato's Timaeus*.[67] Here we also find a discussion of mixture ($659^{11}$-$661^{14}$). Simplicius reports that Proclus gave an adequate reply to Alexander ($660^{4-14}$). Proclus' second argument is most striking: "No wonder if there is juxtaposition, not union. For [the ingredients] also had to be separable from each other" ($660^{7-8}$). Proclus simply constructs a contradiction between Aristotle's requirements that the elements in a mixture are separable again and that the mixture is a unity: if the former, not the latter. Exit Aristotle's theory of mixture! The thrust of his argument is not unlike the Eleatic argument Aristotle set out to overcome in *De generatione et corruptione* I.10.

Simplicius develops Proclus' idea ($660^{19}$ ff.) and suggests that even the four elements are merely juxtaposed in small particles. He explains that the appearance of unity and continuity is caused by the unity of the form of flesh or bone that supervenes, just as robes made of threads of different colours give the impression of one mixed colour. The same applies to the four elements:

1. So even when the four elements, juxtaposed to each other, exchange qualities and in some way alter each other towards themselves, even so their bodies themselves neither pervade one another nor are they unified with each other nor do they change into each other completely. This is evident from the fact that the elements are separated again in the case of corruption, and each of them moves towards its own wholeness because they inhered in actuality.
2. For if each lost its own form during composition, how does it receive it again on the corruption of the composite? For even if during the composition they change towards each other and the water in us is made airy and the air kindles, even so their bodies hold together by contact, and generally constitute an analogue to glue used in the arts. The glue does not make things continuous either, because the limits of the things glued together do not disappear.

65. In Arabic and Latin medieval commentaries on the *De caelo* this passage often provides the occasion for a discussion of mixture; see e.g. Avicenna *De caelo*, III summa VIII cap. 3, Averroes *De caelo*, III comm. 67, Albertus Magnus *De caelo et mundo*, III tr. 2 c. 1.
66. In Alexander, *De mixtione*, II, p. $215^{22-27}$ a theory of mixture that employs the juxtaposition of surfaces is mentioned and dismissed without further discussion. Simplicius reports Alexander to have claimed that, even if we allow the triangles to constitute the elements, they do not constitute bodies, so that every atomic theory does away with generation altogether (Simplicius, *In Aristotelis De caelo commentaria* (Heiberg), pp. $659^{33}$-$660^{3}$).
67. Cf. Proclus, *In Platonis Timaeum commentaria* (Diehl), I, p. $404^{20-21}$, II, p. $279^{2-4}$ for the existence of this work.

> 3. It is rather as when a number of torches come together and all their flames mix and appear to be one, but when the torches are separated each torch's own flame and the light it spreads are drawn apart with them. In this way too the conglomerate of the four elements displays a single appearance while their bodies are adjacent to each other and mutually alter each other by means of their qualities. In the same way a song composed of different sounds mixed by juxtaposition in small parts also appears to be a unity. Some such thing the so-called blend is too: a common alteration of bodies adjacent to each other, as long as they are adjacent.[68]

This is a view of mixture that agrees for the most part with the atomistic spirit of Plato's *Timaeus*. Mixture is merely apparent, because against the Stoics it must be held that the elements can never pervade each other *qua* bodies.[69] Moreover, complete blending cannot explain the increase of volume of the mixture.[70] At the same time the absence of pervasion explains why the elements can be separated again. Hence Simplicius believes, against Aristotle, that the elements remain present in the mixture in actuality (§1) — he has no need for the potentiality that Aristotle brings into play.[71] The elements remain discontinuous, only held together by contact as if they are glued together (§2).[72]

When dealing with the shape of squeezed elementary particles (*In Aristotelis De caelo commentaria* 657$^{2-9}$) Simplicius is willing to allow some loss of purity although *pace* Philoponus that does not result in corruption. Although the particles have lost their pure shape (τὸ σχῆμα εἰλικρινές) they should not be called "out of elements": "they are elements but somewhat unnaturally disposed." He makes a rhetorical appeal to the fact that "to some people" a similar anomaly of

68. Simplicius, *In Aristotelis De caelo commentaria* (Heiberg), pp. 660$^{26}$-661$^{14}$: "κἂν παρακείμενα οὖν ἀλλήλοις τὰ τέσσαρα στοιχεῖα τὰς ποιότητας διαδίδωσι καὶ ἀλλοιοῖ πως ἄλληλα πρὸς ἑαυτά, ἀλλὰ τά γε σώματα αὐτὰ οὐ χωρεῖ δι' ἀλλήλων οὔτε ἥνωται πρὸς ἄλληλα οὔτε μετέβαλεν εἰς ἄλληλα τελέως. δηλοῖ δὲ τὸ ἐν τῇ φθορᾷ χωρίζεσθαι πάλιν τὰ στοιχεῖα καὶ ἕκαστον εἰς τὴν οἰκείαν ὁλότητα χωρεῖν ὡς ἐνεργείᾳ ἐνυπάρχοντα. εἰ γὰρ ἐν τῇ συνθέσει ἀπώλεσεν ἕκαστον τὸ ἑαυτοῦ εἶδος, πῶς ἐν τῇ φθορᾷ τοῦ συνθέτου πάλιν αὐτὸ ἀπολαμβάνει; κἂν γὰρ ἐν τῷ συνθέτῳ μεταβάλλει εἰς ἄλληλά τινα καὶ τό τε ὕδωρ τὸ ἐν ἡμῖν ἐξαεροῦται καὶ ὁ ἀὴρ ἐκφλογοῦται, ἀλλὰ τά γε σώματα αὐτῶν ἁφῇ συνῆπται, καί τι πάντως ἐστὶ καὶ τῇ κόλλῃ τῇ κατὰ τὰς τέχνας ἀνάλογον· οὐδὲ ἡ κόλλα δὲ συνεχῆ ποιεῖ· οὐδὲ γὰρ ἀφανίζει τῶν κολλωμένων τὰ πέρατα· ἀλλ' ὥσπερ πλειόνων λαμπάδων συνιουσῶν ἡ πασῶν φλὸξ μίγνυται καὶ μία εἶναι δοκεῖ, χωριζομένων δὲ τῶν λαμπάδων συναποσπᾶται ἡ οἰκεία ἑκάστης φλὸξ καὶ τὸ ἀπὸ τῆς φλογὸς φῶς, οὕτω καὶ ἡ τῶν τεσσάρων στοιχείων σύνοδος τῶν σωμάτων παρακειμένων καὶ συναλλοιούντων ἄλληλα ταῖς ποιότησι μίαν ἐπιπρέπειαν ἐμφαίνει, ὥσπερ καὶ τὸ ἀπὸ διαφόρων ψόφων συγκείμενον μέλος τῇ κατὰ μικρὰ παραθέσει κεκραμένον καὶ ἓν εἶναι δοκοῦν. τοιοῦτον γάρ τι καὶ ἡ λεγομένη κρᾶσίς ἐστι σωμάτων ἀλλήλοις παρακειμένων, ἕως ἂν παρακέηται, συναλλοίωσις."

69. See e.g. Simplicius, *In Aristotelis Physicorum libros quattuor priores commentaria* (Diels), pp. 530$^{9}$-531$^{10}$. Cf. Sorabji, *Matter, Space and Motion*, Ch. 5.

70. For this issue see Sorabji, *Matter, Space and Motion*, p. 72, cf. Plotinus, *Enneades*, II.7 [37], p. 1$^{15-20}$.

71. For Simplicius' reservations about the potentiality of mixed ingredients see esp. *In Aristotelis Categorias commentarium* (Kalbfleisch), p. 281$^{4-6}$ σύνθετον γὰρ ποιεῖ τὸ μέσον ἐκ τῶν ἄκρων καὶ ὡς ἐξ ἀμφοῖν συνιστάμενον, ἀλλ' οὐχ ἕν τι παρὰ τὰ ἄκρα, ἐνεργείᾳ τε διαφυλάττει τὰ ἁπλᾶ ἐν τῷ μίγματι, ἀλλ' οὐχὶ κατὰ δύναμιν, *εἴπερ ἄρα καὶ τοῦτο οἷόν τε.*

72. This seems to be a clear reminiscence of *Timaeus*, 42e-43a, esp. 43a2: συνεκόλλων.

the elements is acceptable in mixtures and various changes. Here he is in clear opposition to Philoponus who only allows preservation of the elements when the purity of the qualities is preserved.

On the other hand (§3), since the bodies are adjacent to each other the immaterial qualities that inhere in them may mutually affect each other, much as Aristotle described. Here, as in Aristotle, contact is a necessary requirement for the "mixture" to occur. A bundle of torches is a vivid image of this conception (§3): the flame and the light it spreads appear to be a single new item (like the form of the mixture) but when the torches are separated it becomes clear that there was no such thing as a new unity.

Simplicius' distinction between separation *qua* body and mutual interaction *qua* qualities seems to be a conscious answer to Alexander, with whom he shared the rejection of Stoic blending. However, Alexander clearly stated that in the case of mixture "a single body comes to be *both* with respect to the substrate *and* with respect to the quality."[73] He subscribed to Aristotle's definition of mixture as "the unification of mixables when altered," which he glosses in a way that contains much of the vocabulary Simplicius used: "The unification through action and passion of bodies adjacent to each other through change, without corruption of any of them."[74] Simplicius' definition is phrased as a rival definition: "A common alteration of bodies adjacent to each other as long as they are adjacent."[75]

As we may expect from a Neoplatonist, the supervenience of the form on a mixture is not the same as the unity of form and matter in Aristotle. True unity must remain the prerogative of the intelligible realm, for which the interweaving of forms in Plato's *Sophist* is an important precedent.[76] Simplicius regards the lack of union at the corporeal level as a manifestation of the dispersion and scattering that distinguishes the physical realm from the intelligible.[77] Elsewhere

73. Alexander Aphrodisiensis, *De mixtione* (Bruns), XV, p. 231[15-16]: "ἕν τι γίνεται σῶμα καὶ κατὰ τὸ ὑποκείμενον καὶ κατὰ τὴν ποιότητα."
74. *Ibid.*, XIV, p. 231[10-12]: "ἡ γὰρ διὰ τοῦ ποιεῖν καὶ πάσχειν τῶν παρακειμένων ἀλλήλοις σωμάτων διὰ μεταβολῆς χωρὶς φθορᾶς αὐτῶν τινος ἕνωσις."
75. Simplicius, *In Aristotelis De caelo commentaria* (Heiberg), p. 661[13-14]: "σωμάτων ἀλλήλοις παρακειμένων, ἕως ἂν παρακέηται, συναλλοίωσις."
76. Cf. Simplicius, *In Aristotelis Physicorum libros quattuor priores commentaria* (Diels), p. 100[1-22] esp. 15-18.
77. A concise statement to this effect is Simplicius, *In Aristotelis Physicorum libros quattuor priores commentaria* (Diels), p. 531[5-7]: "μήποτε οὖν τὰ μὲν ὑπὸ σελήνην ἅτε ὑλικώτατα καὶ ἀντίτυπα καὶ φύσει ἀλλήλων διεσπασμένα οὐ χωρεῖ δι' ἀλλήλων (διὸ καὶ μιγνύμενα μεῖζόν τι ποιεῖ), τὰ δὲ οὐράνια οὐχ οὕτως." "So perhaps sublunary [bodies] do not pervade each other because they are most material and resistant and by nature scattered from each other (hence, too, mixed entities constitute something larger), but the heavenly bodies are different." Cf. more elaborately Simplicius, *Commentaire sur le Manuel d'Épictète* (Hadot), XXXVIII, pp. 361-399. According to Simplicius the scattering is caused by indefinite three-dimensional prime matter, see Sorabji, *Matter, Space and Motion*, pp. 7-18, De Haas, *John Philoponus' New Definition*, pp. 120 ff.

he also questions the blending of physical qualities. At *In Aristotelis Categorias commentarium* 281[2-31] he reports that Plotinus' view of *krasis* as the blending of extremities which produces another quality (not substance) from the blend, was not accepted wholesale by later philosophers. They did accept that the intermediate quality was different from the extremities, but not as the result of blending or composition, for these are corporeal processes inappropriate to immaterial qualities. The superior view is that physical mixture does not occur at all since each so-called intermediate quality is caused directly by its own intelligible *logos*.[78] It is clear that in this framework the unity and continuity of a mixture that was so dear to Aristotle cannot survive.[79]

How does Philoponus' position compare? Between Aristotle's text, Alexander's authoritative interpretation, and the rivalling Stoic theory of blending Philoponus finds a different route than Simplicius. Against Proclus and Simplicius and with Alexander, Philoponus accepts the notion of mixture. He even elaborates on the notion of potentiality involved. With Proclus and Simplicius but against Alexander, Philoponus limits mixture to the level of qualities, although like Alexander he opposes qualities to forms rather than bodies. Unlike Proclus and Simplicius he seems to question neither the unity of the mixture nor the possibility of regaining the ingredients from it.

Philoponus' acceptance of mixture and the type of potentiality involved leads him to interesting speculations on a third sense of "potentiality." For Philoponus this third sense of "potentiality" is not restricted to the explanation of mixture: his examples show that the range between first and second potentiality is exhibited in all areas where its extremities are found. More specifically, the third type of potentiality also features in Philoponus' explanation of recollection in an Aristotelian framework, where it has parallels in Simplicius.[80] More research is needed to see how this particular range or latitude is connected to Neoplatonic physics and metaphysics in general.[81]

## Conclusion

In this study I have tried to show that Philoponus' commentary on Aristotle's account of mixture has to be understood against the background of a discussion between three views of mixture that dominated the Aristotelian tradition as a

78. At *In Categorias*, p. 281[7-15] Simplicius (Iamblichus?) argues against colours as proper mixtures of the opposites white and black, drawing on Aristoteles, *De sensu et sensibilibus*, 439b17-440b24 in support for the view that παράθεσις τῶν ἄκρων ἢ ἐπιπόλασις ἢ πόρρωθεν ἀπόστασις is what we are dealing with in this case. However, in that passage Aristotle argues that these alternatives are to be rejected in favour of the mixture view!

79. In the tentative discussion at *In Aristotelis De caelo commentaria*, p. 306[1-16] Simplicius is close to attributing a theory of combination, not mixture, to Aristotle. See further Simplicius, *In Aristotelis De anima commentaria* (Hayduck), p. 52[19-22].

80. See my paper "Recollection," forthcoming.

81. To this end I am currently preparing a paper entitled "More and less in Neoplatonic commentaries on Aristotle's *Categories*."

whole. My starting point was Zabarella's classification of solutions to the main problem of mixture: how to interpret Aristotle's claim that the ingredients are preserved in the mixture in potentiality. If we correct and supplement Zabarella's classification on the basis of our findings, the following table is the result.

| | *Forms* | *Qualities* |
|---|---|---|
| 1. Early neo-Aristotelians, [Proclus, Simplicius], Avicenna | preserved in actuality | preserved in reduced actuality |
| 2. Alexander, Averroes, Zabarella | preserved in reduced actuality | preserved in reduced actuality |
| 3. Duns Scotus | perish | perish |
| 4. Philoponus, Marsilius, Thomas, Aegidius, Buccaferreus | perish | preserved in reduced actuality |

In a sense Proclus and Simplicius belong with Avicenna because they accept the preservation of the elements in actuality, along with reduced actuality and interaction in the realm of qualities. However, since they reject Aristotelian mixture and discuss the problem in terms of body vs. qualities rather than forms vs. qualities they are best regarded as belonging to a different school altogether. Alexander is probably the main source of the influential account of Averroes. Philoponus belongs with the fourth group due to his criticism of Aristotle (or rather Alexander). He accepts the corruption of the ingredients while only their qualities are preserved in reduced actuality. It remains to see whether his influence on the medieval authors that subscribe to a similar view can be established.

Zabarella's reports on his sources should be handled with care. His summaries of Alexander are inadequate, his understanding of Philoponus is wrong. He himself claims that his "true" interpretation of Averroes was not followed by any Averroist (see e.g. 465A, 466B) which should give us pause as well. Moreover, I fail to see how he can believe that his complicated interpretation of Averroes can be backed up by his interpretation of Alexander and Philoponus: they seem to represent three quite different doctrines indeed. Although a quick glance at Zabarella's other medieval sources seems to confirm his classification of them it cannot be ruled out that closer inspection will yield some surprises as it did with Philoponus. The details of Zabarella's own theory of mixture still await further investigation.

To conclude on a more general note: in charting the commentary tradition on Aristotle's work from Late Antiquity through Arabic, Latin Medieval, and Renaissance authors it is tempting to assume we are dealing with a single line of tradition. However, it is still far from clear which ancient commentaries were available (in Greek or in Arabic, Syrian, or Latin translation) at what date. But even if this can be established we cannot be sure that a particular commentator actually used his predecessors' commentaries, even when he refers to them by

name: perhaps he merely copied a reference from another commentary. In this way Zabarella's mistake may have arisen. More importantly, every commentator who analyses the problem of the potentiality of the ingredients in a mixture as it is presented in Aristotle's texts in *On generation and corruption* is faced with a limited number of possible solutions. Every commentator, then, is perfectly capable of re-inventing the wheel. However, the application of the third kind of potentiality in the context of mixture seems to have been invented for the first time by John Philoponus.

# Le concept d'ἐλάχιστον chez Aristote et ses principaux commentateurs grecs[1]

*Henk Kubbinga*

## Introduction

La théorie moléculaire moderne remonte au début du XVII[e] siècle lorsqu'elle fut conçue par les savants Isaac Beeckman (1588 – 1637) et Sébastien Basson (c. 1580 – première moitié du XVII[e] siècle).[2] Or la notion de "molécule" relève du concept plus général d' "individu substantiel" au sens de la condition à la fois nécessaire et suffissante pour l'existence d'un matériau.[3] Ce concept nous a paru une innovation cruciale conçue dans la tradition grecque.[4] Par les problèmes en cause, notamment celui de la divisibilité limitée ou illimitée de grandeurs et celui de la constitution de matériaux, il relève aussi de l'histoire du débat scolastique sur les *minima naturels*.[5] En fait, les premiers *minima naturels* étaient de véritables "individus substantiels."

1. Reconnaissance: Notre étude a été réalisée grâce à une bourse de l'*Académie royale néerlandaise des Sciences et des Arts*. Nous remercions très volontiers M W. G. L. Randles (*Ecole des hautes études en sciences sociales*, Paris) qui, lors de la séance de son séminaire du 19 mars 1991, a bien voulu nous permettre de faire une communication concernant la théorie de la matière chez les commentateurs grecs d'Aristote. Nous remercions également M R. Sorabji (*King's College*, Londres, et *Wolfson College*, Oxford) de son intérêt chaleureux. Notre reconnaissance concerne aussi M F. A. J. de Haas (*Université d'Utrecht*) du fait de son aimable collaboration. Cette étude est dédiée à notre ancien collègue et grand linguiste M J. H. J. Veerman en témoignage d'un profond respect.

2. Basson fut l'auteur d'un ouvrage remarquable intitulé *Philosophia naturalis adversus Aristotelem libri XII* (Genève, 1621) lequel contient sa théorie moléculaire. C'était virtuellement la seule trace qu'il a laissée dans l'histoire. Il vient d'être identifié, enfin; voir Lüthy, "Thoughts and Circumstances."

3. Nous distinguons par la suite *substance, matière* et *matériau*. Une *substance* est une unité de *matière* et de *forme*; cette *matière* et cette *forme* ne sauraient exister isolément l'une de l'autre. Un *matériau* est un composant d'une *substance*, comme la chair et l'os sont des composants d'un animal. Un *matériau* est donc quelque chose de concrète. Ainsi, l'or et l'eau sont des *matériaux* comparables à la chair et à l'os. Le langage courant parle, malgré tout, de *la théorie de la matière* au sens de toute considération qui se rapporte aux *matériaux* à notre échelle et à leur composition physico-chimique.

4. Kubbinga, *L'Histoire du concept de "molécule"*.

5. Peter Hoenen S.J. (1880 – 1961) et Andreas van Melsen (1912 – 1994) ont signalé, chez les commentateurs grecs, la limitation de la doctrine de maxima et de minima d'Aristote; depuis il n'y aura question que d'une doctrine de *minima naturels*. Voir Hoenen, *Cosmologia*, 2e éd., p. 510 et Van Melsen, *Van atomos naar atoom*, pp. 68-70.

Dans le présent chapitre nous voudrions dépeindre la naissance du concept d' "individu substantiel" chez les commentateurs hellénistes et ceci contre l'arrière-fond de la pensée d'Aristote.[6] La discussion paraît graviter autour de la notion d'ἐλάχιστον, qui, comme nous le verrons ci-après, remonte à Anaxagore de Clazomène (500? – 428? av. J.-C.). Il nous faudra d'abord étudier sa position chez Aristote, dans les traités plutôt philosophiques (*Physique, De l'âme, De la sensation et des sensibles*), d'une part, et le traité plutôt physico-chimique *De la génération et de la corruption*, d'autre part. Ensuite il faudra analyser les principaux commentaires grecs sur les ouvrages mentionnés. Il s'agit notamment des travaux d'Alexandre d'Aphrodise (*fl.* II$^{e}$ – III$^{e}$ s.), de Thémistius (317? – c. 388), de Jean Philopon (c. 490 – c. 570) et de Simplicius (c. 500 – après 533).[7] Ce qui reste encore dans le vague chez Simplicius, est développé de façon éclatante chez Philopon. Notre interprétation se lit en quelque sorte en complément de la très judicieuse étude de Frans de Haas sur la théorie de la "matière première" chez Philopon.[8] Enfin, si l'on a cru jusqu'ici que cette idée d'*individu substantiel* remonte au XVII$^{e}$ siècle, il s'agit apparemment chez Basson comme chez Beeckman, d'une résurgence plutôt que d'une innovation.

## Aristote

C'est surtout dans la *Physique* qu'Aristote traite de la divisibilité des continua, dont il distingue quatre genres: celui des matériaux, celui du temps, celui de la grandeur et celui du mouvement.[9] Ce problème de la divisibilité est lié au problème de l'existence éventuelle de l'*infini* et ceci sous tous les rapports imaginables. Ainsi en discutant la notion de l'infini chez ses prédécesseurs, Aristote combat l'idée des Ioniens selon laquelle tout provient d'un seul élément de dimensions infinies. Il s'oppose également à Leucippe et à Démocrite qui avaient soutenu l'existence d'une infinité d'atomes dans un vide illimité. De même, Aristote ne convient pas non plus ce qu'avait dit Anaxagore, à savoir que toute chose contient les germes de toutes les autres choses: si cela était véridique, une infinité d'espèces de germes — chacune en nombre infini — coexisteraient dans le même objet, ce qui est impossible du moment où l'on admet que ces germes devront avoir une certaine taille. En effet, Aristote argue que toute substance — plus particulièrement: tout animal et toute plante — et,

6. Pour une introduction aux problèmes en cause, voir Verbeke, "La physique d'Aristote et les anciens commentaires grecs."
7. Notre recherche s'inscrit par ailleurs dans le renouveau spectaculaire que connaissent les études sur les commentateurs grecs d'Aristote, mouvement inauguré, au début des années 1980, et soutenu brillamment par Richard Sorabji. Voir Sorabji, *The Ancient Commentators*.
8. De Haas, *John Philoponus on Matter* et aussi *John Philoponus' New Definition*.
9. Nous citons Aristote d'après les *Oxford Classical Texts*.

par conséquent, tout matériau le composant connaît des termes de grandeur et de petitesse. Il s'exprime ainsi:[10]

> " ... si par conséquent il est impossible qu'un animal ou une plante sera quelconque quant à la grandeur et la petitesse, il est clair que ceci vaudra également pour ses parties."

et en conclut:[11]

> "Il est donc évident que la taille de chair ou d'os ou de quelque autre matériau [semblable] ne puisse être quelconque, selon la grandeur ou la petitesse."

Autrement dit: pour toute espèce d'animal ou de plante il y a un intervalle d'étendue, en sorte qu'on ne trouvera jamais un exemplaire qui soit plus grand que le maximum ou plus petit que le minimum. Ceci vaudrait également pour les matériaux qui composent un animal, par exemple, tels que la chair et l'os. C'est de ce point de vue qu'il faut juger l'expérience de pensée qu'Aristote avance pour combattre la doctrine d'Anaxagore:[12]

> "Ainsi s'il est vrai, d'une part, que toutes les choses se trouvent les unes dans les autres et ne naissent pas mais résultent d'une séparation de choses qui y sont dedans et qu'elles sont appelées d'après ce qui domine et que toute chose provient de toute autre chose — comme l'eau qui se sépare de la chair ou la chair qui se sépare de l'eau — et, d'autre part, que tout corps de dimensions limitées dont on prélève de parties limitées, s'épuisera [à un moment donné], il est clair qu'il est impossible que tout existe dans tout. En effet, lorsqu'on ôterait de la chair d'une quantité d'eau, et qu'on continuerait à séparer de la chair de l'eau qui reste, même si ce que l'on prélève soit toujours plus petit, la quantité qui reste ne dépassera pas un certain degré de petitesse. Ainsi, si la séparation s'achevait, tout ne serait pas dans tout (en effet dans l'eau qui reste, il n'y aura plus de chair); si par contre elle ne s'achevait pas mais continuait toujours, il y aurait dans un objet de dimensions limitées un nombre infini de parties limitées et égales; ceci est impossible. En outre, s'il est inévitable que le prélèvement de quelque chose d'un certain corps le rend plus petit et encore que la taille d'une quantité de chair est définie selon la grandeur et la petitesse, il est clair que de la plus petite partie de chair aucun corps [= aucune quantité de chair] ne saurait être extrait, puisqu'il serait plus petit que la partie la plus petite possible."

Nous signalons qu'Aristote se sert ici du mot ἐλαχίστη comme adjectif pour indiquer "la plus petite possible," donc au sens d'un superlatif relatif. Un peu plus loin, dans la *Physique* III, 6, il le reprend pour indiquer le numériquement

10. Aristoteles, *Physica*, I, 4, 187b16-18: "εἰ δὴ ἀδύνατον ζῷον ἢ φυτὸν ὁπηλικονοῦν εἶναι κατὰ μέγεθος καὶ μικρότητα, φανερὸν ὅτι οὐδὲ τῶν μορίων ὁτιοῦν."
11. *Ibid.*, I, 4, 187b20-21: "δῆλον τοίνυν ὅτι ἀδύνατον σάρκα ἢ ὀστοῦν ἢ ἄλλο τι ὁπηλικονοῦν εἶναι τὸ μέγεθος ἢ ἐπὶ τὸ μεῖζον ἢ ἐπὶ τὸ ἔλαττον."
12. *Ibid.*, I, 4, 187b22-188a2: "ἔτι εἰ πάντα μὲν ἐνυπάρχει τὰ τοιαῦτα ἐν ἀλλήλοις, καὶ μὴ γίγνεται ἀλλ' ἐκκρίνεται ἐνόντα, λέγεται δὲ ἀπὸ τοῦ πλείονος, γίγνεται δὲ ἐξ ὁτουοῦν ὁτιοῦν (οἷον ἐκ σαρκὸς ὕδωρ ἐκκρινόμενον καὶ σὰρξ ἐξ ὕδατος), ἅπαν δὲ σῶμα πεπερασμένον ἀναιρεῖται ὑπὸ σώματος πεπερασμένου, φανερὸν ὅτι οὐκ ἐνδέχεται ἐν ἑκάστῳ ἕκαστον ὑπάρχειν. ἀφαιρεθείσης γὰρ ἐκ τοῦ ὕδατος σαρκός, καὶ πάλιν ἄλλης γενομένης ἐκ τοῦ λοιποῦ ἀποκρίσει, εἰ καὶ ἀεὶ ἐλάττων ἔσται ἡ ἐκκρινομένη, ἀλλ' ὅμως οὐχ ὑπερβαλεῖ μέγεθός τι τῇ μικρότητι. ὥστ' εἰ μὲν στήσεται ἡ ἔκκρισις, οὐχ ἅπαν ἐν παντὶ ἐνέσται (ἐν γὰρ τῷ λοιπῷ ὕδατι οὐκ ἐνυπάρξει σάρξ), εἰ δὲ μὴ στήσεται ἀλλ' ἀεὶ ἕξει ἀφαίρεσιν, ἐν πεπερασμένῳ μεγέθει ἴσα πεπερασμένα ἐνέσται ἄπειρα τὸ πλῆθος· τοῦτο δ' ἀδύνατον. πρὸς δὲ τούτοις, εἰ ἅπαν μὲν σῶμα ἀφαιρεθέντος τινὸς ἔλαττον ἀνάγκη γίγνεσθαι, τῆς δὲ σαρκὸς ὥρισται τὸ ποσὸν καὶ μεγέθει καὶ μικρότητι, φανερὸν ὅτι ἐκ τῆς ἐλαχίστης σαρκὸς οὐθὲν ἐκκριθήσεται σῶμα· ἔσται γὰρ ἐλάττων τῆς ἐλαχίστης."

un, le terme ultime des nombres.[13] Le mot est déjà dans l'un des fragments d'Anaxagore mis en cause par Aristote; ce fragment dit que quant à la petitesse des germes, il n'y a pas un minimum, mais qu'il y aura toujours un plus petit.[14]

L'existence d'un intervalle d'étendue pour toute substance est soutenue par d'autres textes. Dans la *Physique* VI, 10 Aristote fait valoir que le maximum de telle ou telle espèce d'animal ou de plante correspond avec sa grandeur à l'état adulte, alors que le minimum serait l'autre extrême en-deça duquel elle perdrait sa nature.[15] Dans *De l'âme* II, 4 il y ajoute que de telles limites relèvent de la *forme* d'une substance.[16] Néanmoins, comme nous le verrons ci-après, le contexte de la *Physique* VI, 10 ne nous permet pas d'extrapoler des substances aux matériaux composants.

Ayant traité des particularités des substances (leur nature, la division des sciences qui en découle et les quatre causes), Aristote va parler, dans la *Physique* VI, des changements qu'elles peuvent subir, à savoir changements de nature, de qualité, de quantité et de place, avec leurs corollaires de grandeur et de temps. Ces changements ainsi que leurs corollaires sont présentés comme des continua et en tant que tels ils seraient infiniment divisibles. Dans ce contexte il est évident qu'un matériau, lui aussi, devra être infiniment divisible, pourqu'un changement de nature — disons: une réaction chimique — puisse s'effectuer. Dans l'hypothèse contraire, il y aura des soi-disant "sans-parties" (ἀμερῆ).[17] Supposons alors qu'un tel "sans-parties" subirait une transformation; étant donné qu'une transformation prendra du temps, il y aurait alors des moments où une partie d'un "sans-parties" est transformée, alors que l'autre partie ne l'est pas encore. Ceci reviendrait à une nette contradiction dans les termes.[18]

La conclusion s'impose que le rejet du caractère illimité de la divisibilité de matériaux, sousentendu dans la *Physique* VI, 10, implique une inconséquence assez nette par rapport à la doctrine de maxima et de minima du début de la *Physique*.

Dans le traité *De la génération*, I, 10 Aristote manifeste la même ambiguïté. Il s'agit du processus de *mixtion* qui serait favorisé par une division des corps réagissants en petites particules. Sur ce point Aristote dit deux choses apparemment contradictoires.[19] Il nie d'abord carrément et sans spécifications qu'un

13. *Ibid.*, III, 6, 206b30-32; voir aussi *ibid.*, III, 7, 207b1-2.
14. *Die Fragmente der Vorsokratiker* (Diels e.a.): Anaxagoras, fragment B.3: "οὔτε γὰρ τοῦ σμικροῦ ἐστι τό γε ἐλάχιστον, ἀλλ' ἔλαττον ἀεί ... ."
15. Aristoteles, *Physica*, VI, 10, 241a33-241b2.
16. Aristoteles, *De anima*, II, 4, 416a16-18.
17. Il les définit ainsi: "j'appelle sans-parties ce qui est indivisible quant à l'étendue" ["ἀμερὲς δὲ λέγω τὸ κατὰ ποσὸν ἀδιαίρετον"]. Voir Aristoteles, *Physica*, VI, 10, 240b12-13.
18. *Ibid.*, VI, 10, 240b31 et suiv.
19. L'ambiguïté en question n'est pas reconnue généralement; voir, par ex., Aristotle, *On Coming-to-be & Passing-away* (Joachim), surtout pp. 184-185.

matériau puisse être divisé actuellement en ses ἐλάχιστα,[20] ce qui semble signifier le suivant: quoiqu'il y ait effectivement une limite inférieure à la grandeur d'un matériau, il est en fait impossible de réaliser la division à tel point. Signalons par ailleurs qu'Aristote a substantivé le superlatif relatif dont il se servait auparavant pour indiquer la grandeur minimale de telle ou telle chose. Un peu plus loin cependant il fait ressortir qu'un *mixte* devrait être un tout et partant parfaitement homogène:[21] de même que toute partie d'eau est eau, de même toute partie du mixte est mixte. Bien entendu: toute partie, *quelque petite qu'elle soit*, ce qui s'oppose à l'hypothèse d'une limite inférieure.

Dans le traité *De la sensation* Aristote arrive à la même conclusion. Son récit concerne le rapport entre l'*étendue* et la *perceptibilité* de matériaux. En se référant à la divisibilité illimitée de matériaux, telle qu'il l'avait proclamée dans *De la génération* I, 10, le Stagirite fait ressortir qu'un matériau pour être sensible pour soi, ne saurait être infiniment grande ou infiniment petite, quoique toute particule *quelque petite qu'elle soit*, soit toujours pesante, colorée et douée de toutes les autres qualités propre à l'espèce.[22] Or Aristote se sauve de l'aporie évidente en distinguant *perceptibilité en puissance* de *perceptibilité en acte*: un grain de millet est visible, mais sa dix-millième partie qui est assurément dedans se soustrait à la sensation.[23] C'est-à-dire: considérée pour soi, elle n'est sensible qu'en puissance, car aussitôt qu'elle se trouve isolée du tout auquel elle appartenait, elle se perd dans l'environnement comme la goutte fragrante jetée dans la mer. Cette perceptibilité ne dépend donc pas tellement de la faiblesse de la vue humaine, mais relève du fait que la partie en question ne saurait subsister pour soi. L'argument est très proche de celui avancé là où Aristote fait voir qu'une goutte de vin ajoutée à une grande quantité d'eau est simplement transformée en la nature de l'eau.[24] L'inégalité des forces est telle que la goutte est vaincue par le matériau environnant si bien que la quantité totale d'eau augmente avec justement cette goutte.

C'est dans le contexte du mélange de couleurs, dans le traité *De la sensation*, qu'Aristote précise ses vues sur le processus de *mixtion* tout en présentant une définition de ce qui est devenu entretemps un concept à part entière, à savoir l'ἐλάχιστον. Pour raisons de clarté nous citons tout le passage concerné:[25]

20. Aristoteles, *De generatione et corruptione*, I, 10, 328a5-6: "ἐπεὶ δ' οὐκ ἔστιν εἰς τἀλάχιστα διαιρεθῆναι ... "
21. *Ibid.*, I, 10, 328a10-12: "φαμὲν δ', εἴπερ δεῖ μεμίχθαι τι, τὸ μιχθὲν ὁμοιομερὲς εἶναι, καὶ ὥσπερ τοῦ ὕδατος τὸ μέρος ὕδωρ, οὕτω καὶ τοῦ κραθέντος."
22. Aristoteles, *De sensu et sensibilibus*, 6.
23. *Ibid.*, 6, 445b29 et suiv.
24. Aristoteles, *De generatione et corruptione*, I, 10, 328a26-28.
25. Aristoteles, *De sensu et sensibilibus*, 440a31-b12: "Εἰ δ' ἔστι μίξις τῶν σωμάτων μὴ μόνον τὸν τρόπον τοῦτον ὅνπερ οἴονταί τινες, παρ' ἄλληλα τῶν ἐλαχίστων τιθεμένων, ἀδήλων δ' ἡμῖν διὰ τὴν αἴσθησιν, ἀλλ' ὅλως πάντη πάντως, ὥσπερ ἐν τοῖς περὶ μίξεως εἴρηται καθόλου περὶ πάντων (ἐκείνως μὲν γὰρ μείγνυται ταῦτα μόνον ὅσα ἐνδέχεται διελεῖν εἰς τὰ ἐλάχιστα, καθάπερ ἀνθρώπους ⟨ἢ⟩ ἵππους ἢ τὰ σπέρματα· τῶν μὲν γὰρ ἀνθρώπων

> "Lorsqu'il y a mixtion de corps, ce changement ne s'effectue pas tellement, comme le pensent certains, par la juxtaposition de leurs unités [ἐλάχιστα] qui nous sont imperceptibles, mais par la complète fusion de tous, comme il est convenu dans le traité sur la mixtion en général.[26] De ce point de vue-là, ce ne sont que les corps qu'il est possible de diviser en unités [ἐλάχιστα], tels que les hommes, les chevaux ou les semences, qui réagiraient entre eux; des hommes, l'homme est l'unité [ἐλάχιστον], des chevaux le cheval; ainsi, par la juxtaposition de ceux-ci, la masse des réactants réagirait. Mais [nous, par contre,] nous ne disons pas qu'un seul homme réagit avec un seul cheval. Toutefois, les choses qui ne sont pas divisibles jusqu'à l'unité ne peuvent pas réagir de cette manière, mais réagissent par une fusion complète, lesquelles choses sont aussi les plus aptes à subir ce processus."

Ce fragment nous semble très parlant pour ce qui est du concept d'ἐλάχιστον. Ce dernier se rapporte à l'évidence à quelque chose d'individuel appartenant à une espèce. Sa signification a donc manifestement évolué par rapport à la doctrine de maxima et de minima, ce qui ne tardera pas à compliquer les affaires.

En résumant la position d'Aristote nous dirons qu'il est question de deux sentences qui semblent s'exclure mutuellement: il y a d'une part la sentence qui attribue à toute substance (et tout matériau) un intervalle d'étendue inserré entre un maximum et un minimum et, d'autre part, celle qui concerne leur état de continuum et partant leur divisibilité illimitée. En changeant de point de vue, le concept d'ἐλάχιστον change d'aspect. D'une part il indique — en tant que complément de μέγιστον — la limite inférieure en deça de laquelle une substance ou un matériau ne puisse exister ou subsister. Il concerne, d'autre part, l'unité numérique d'un ensemble, ce qui est tout autre chose.

Par la suite nous allons suivre les aléas du concept d'ἐλάχιστον dans les travaux des plus grands commentateurs grecs du Stagirite, savoir Alexandre d'Aphrodise, Thémistius, Simplicius et Philopon.[27]

## Alexandre d'Aphrodise

Alexandre d'Aphrodise occupa, entre 198 et 209 A.D., la chaire impériale de philosophie aristotélicienne à Athènes; il portait comme surnom l'*Interprète* (ὁ Ἐξηγητής) pour la qualité et l'étendue de ses travaux.[28] Alexandre nous a laissé un traité *De la mixtion*.[29] Il y discute successivement les traits généraux du problème de la mixtion, puis les opinions des atomistes et ensuite — bien plus amplement, il est vrai — celle des stoïciens, pour conclure sur la théorie d'Aristote. Pour le moment nous laissons de côté ce qu'Alexandre dit des ato-

ἄνθρωπος ἐλάχιστον, τῶν δ' ἵππων ἵππος· ὥστε τῇ τούτων παρ' ἄλληλα θέσει τὸ πλῆθος μέμεικται τῶν συναμφοτέρων· ἄνθρωπον δὲ ἕνα ἑνὶ ἵππῳ οὐ λέγομεν μεμεῖχθαι· ὅσα δὲ μὴ διαιρεῖται εἰς τὸ ἐλάχιστον, τούτων οὐκ ἐνδέχεται μίξιν γενέσθαι τὸν τρόπον τοῦτον ἀλλὰ τῷ πάντη μεμεῖχθαι, ἅπερ καὶ μάλιστα μείγνυσθαι πέφυκεν."

26. La référence est à *De generatione et corruptione*, I, 10.
27. Nous citons d'après *Commentaria in Aristotelem Graeca* (dir. H. Diels).
28. Sur la personne d'Alexandre, voir Sharples, "The School of Alexander."
29. Alexander Aphrodisiensis, *De mixtione*. Pour une édition critique récente, voir *Alexander of Aphrodisias on Stoic Physics* (Todd).

mistes et des stoïciens. Ce qui nous intéresse ici avant tout c'est la question de savoir comment justement il élabore la doctrine aristotélicienne, avec une attention spéciale pour le concept d'ἐλάχιστον. Or, avec le Stagirite dans *De la génération*, I, 10, Alexandre fait la distinction entre *mixtion* et *mélange*.[30] Dans le *mixte* les composants ne sont pas conservés, alors que dans le *mélange* ils subsistent sous forme de petites particules, comme des grains de blé et des petits pois une fois mélangés. Il souligne également qu'il faut qu'il y ait action et passion de contrariétés, ce qui est le plus manifeste dans le cas des éléments. Puis il précise la différence qui est entre *mixtion* d'une part et *génération et corruption* d'autre part. Il fait remarquer enfin que le processus de *mixtion* est facilité lorsque les composants sont divisés en petites particules. Or, si l'on s'attendait ici peut-être, et à juste titre selon notre opnion, à une allusion à la division éventuelle jusqu'aux ἐλάχιστα, il n'en est toutefois pas question; le terme d'ἐλάχιστον n'est pas non plus utilisé pour les grains de blé et les petits pois, composants d'un *mélange* au sens d'Alexandre. Ce n'est que dans un tout autre contexte qu'il traite des ἐλάχιστα. Nous parlons de son paraphrase du fragment *De la sensation*, 440a31, qui concerne également, comme nous l'avons remarqué chez Aristote, le problème de la *mixtion*. On se souvient qu'Aristote s'était expliqué ainsi: il y a des choses dont on connaît des unités, telles que les hommes, les chevaux et les semences, et il y a des corps qui ne se divisent pas de cette manière. Or la *mixtion* n'est pas possible dans le premier cas: il y aura tout au plus juxtaposition d'hommes et de chevaux, par exemple. Selon Alexandre, il s'agit d'une "juxtaposition d'unités qui y sont conservées."[31]

La véritable *mixtion*, conformément à *De la génération* I, 10, ne concerne que le deuxième genre et s'effectuera par voie d'une fusion complète:[32]

> "on ne dit décidément pas de ces choses qu'elles réagissent en donnant une juxtaposition d'unités, mais que leur mixtion est d'après le tout."

Alexandre cite l'exemple de l'eau et du vin dont le *mixte* manifeste une "forme relevant des deux."[33] Pour ce qui concerne la divisibilité de matériaux Alexandre est du reste aussi ambigu qu'Aristote lui même: il dit que l'on n'atteindra jamais leur unité (ἐλάχιστον) et qu'ils ne se combinent pas par juxtaposition d'unités, ce qui du reste n'exclut formellement pas qu'ils consistent en ces unités.

30. Alexandre, il est vrai, adapte la terminologie. Il distingue deux types de *mixtion* (*Alexander of Aphrodisias on Stoic Physics* (Todd), p. 228.25 et suiv.), à savoir: la *crase* donnant un corps homogène et la *synthèse* qui ne donne qu'un amas d'entités discrètes.
31. Alexander Aphrodisiensis, *In librum De sensu commentarium* (Wendland), p. $64^{9}$: "τῶν ἐλαχίστων ἐν αὐτοῖς σῳζομένων παραθέσει."
32. *Ibid.*, p. $64^{12-13}$: "ταῦτα οὐκέτι οἷόν τε τῇ παραθέσει τῶν ἐλαχίστων μίγνυσθαι λέγειν, ἀλλ' ἐν τούτοις διὰ παντὸς ἡ μῖξις ... "
33. *Ibid.*, p. $64^{24}$: "εἶδος ἐξ ἀμφοτέρων."

## Simplicius

Selon toutes vraisemblances, l'*Interprête* a écrit des commentaires entiers sur *De la génération* et sur la *Physique*, mais ceux-ci n'ont pas survécu.[34] Quelques-unes de ses vues concernant les topiques qui nous intéressent se laissent cependant entrevoir par le détour des travaux de Simplicius, l'un des derniers commentateurs à tendance syncrétique néoplatono-aristotélicienne à la chaire de l'Académie d'Athènes.[35] Ainsi, Simplicius, au sujet de l'argumentation d'Aristote contre Anaxagore dans la *Physique* I, 4, reprend le développement qu'Alexandre lui avait consacré. Il fait voir d'abord qu'Alexandre avait appuyé la sentence des dimensions limitées des animaux et des plantes avec une référence à leur durée de vie également limitée. A en croire Simplicius, Alexandre avait souligné qu'il ne faudrait pas confondre les germes d'Anaxagore avec les semences des animaux et des plantes: les premiers composent le tout en s'accumulant alors que ces dernières ne subsistent point.[36] C'est par ailleurs dans ce contexte qu'il apparaît que, quant à Simplicius, la doctrine d'Anaxagore et la critique d'Aristote ne concernent pas uniquement les matériaux organiques que ce dernier avait cités. Il s'exprime ainsi:[37]

> "Si quelqu'un dit, que toute grandeur est divisible à l'infini et que pour cette raison tout ce que l'on prend [d'un tout] peut être plus petit, il faut savoir que les homoiomères [ὁμοιομέρειαι] n'ont pas simplement une taille [du reste quelconque], mais qu'en tant que *chair, ou os, ou plomb, ou or, ou corps semblables*, elles ont des tailles déterminées, lesquelles ne sont pas capables de conserver leur forme lorsqu'elles sont divisées à l'infini. En tant que grandeur, celles-là se divisent à l'infini; en tant que chair ou os, elles ne se divisent pas."

Remarquons que Simplicius fait abstraction ou presque du contexte aristotélicien: une quantité d'une substance est devenue un agrégat d'ὁμοιομέρειαι dans l'esprit d'Anaxagore, ces dernières — il est vrai, contrairement à ce qu'avait soutenu leur inventeur — n'étant point infiniment petites, mais manifestant une grandeur caractéristique. Simplicius y ajoute que la division d'un tout composé de telles parties redonne ces dernières:[38]

> "Et le tout que l'on compose à partir de ces parties, en est actuellement divisé, tels que les amas homoiomères, mais les corps ne sont pas divisés en tant que corps."

34. *Alexander of Aphrodisias on Stoic Physics* (Todd), "Introduction," p. 14.
35. Sur la personne de Simplicius, voir Hadot, "The Life."
36. Simplicius, *In Aristotelis Physicorum libros quattuor priores commentaria* (Diels), pp. $167^{30}$-$168^{24}$.
37. *Ibid.*, p. $167^{12-17}$: "εἰ δὲ λέγοι τις ὅτι πᾶν μέγεθος ἐπ' ἄπειρόν ἐστι διαιρετὸν καὶ διὰ τοῦτο παντὸς τοῦ λαμβανομένου ἐστὶν ἔλαττον, ἴστω ὅτι αἱ ὁμοιομέρειαι οὐκ εἰσὶν ἁπλῶς μεγέθη, ἀλλ' ἤδη τοιάδε μεγέθη, σὰρξ καὶ ὀστοῦν καὶ μόλυβδος καὶ χρυσὸς καὶ τὰ τοιαῦτα, ἅπερ οὐχ οἷόν τέ ἐστιν ἐπ' ἄπειρον διαιρούμενα φυλάττειν τὸ εἶδος. ὡς μὲν γὰρ μεγέθη, ἐπ' ἄπειρον διαιρεῖται καὶ ταῦτα· ὡς δὲ σὰρξ καὶ ὀστοῦν, οὐκέτι." [dans la traduction, c'est nous qui soulignons].
38. *Ibid.*, p. $167^{18-20}$: "καὶ τὸ ὅλον δὲ ἐξ ἐκείνων σύγκειται τῶν μερῶν εἰς ἃ καὶ διαιρεῖται ἐνεργείᾳ χωριζόμενα οἷα τὰ ὁμοιομερῆ, ἀλλ' οὐχὶ τὰ σώματα καθὸ σώματα."

Autrement dit: la démolition d'un agrégat au sens d'un triage d'ὁμοιομέρειαι ne touche pas à la nature de ces dernières. Il est du reste curieux de constater que Simplicius ne se sert pas du terme d'ἐλάχιστον, mais use du mot ὁμοιομέρεια pour désigner ces particules caractéristiques. Il n'est quand même pas lieu, nous croyons, d'y lire autre chose.

Un peu plus loin, dans le commentaire sur 187b22-34, Simplicius cite complaisamment ce qu'il présente comme l'interprétation d'Alexandre et celle de Thémistius.[39] Le fragment en question décrit l'expérience de pensée qu'Aristote s'était permise pour dénoncer la théorie anaxagorienne selon laquelle tout est dans tout. Or, c'est l'ἐλάχιστον, qui indique, bien dans l'esprit de l'Aristote de la *Physique* I, 4, la petitesse limite d'un matériau. Mais il y a plus. L'argumentation attribuée par Thémistius et Alexandre à Aristote revient à dire que l'extraction de chair d'une quantité déterminée d'eau doit être conçue comme la séparation successive d'ἐλάχιστα, l'un après l'autre. Si cette extraction continuait indéfiniment, ceci impliquerait qu'il y a un nombre infini d'entités égales entre elles dans une quantité limitée d'eau, ce qui est jugé impossible.[40] Or l'innovation, reconnue pour la première fois en tant que telle par Peter Hoenen S.J. (1880 – 1961),[41] est manifeste et consiste en l'idée que s'il y en avait effectivement, comme le veut l'expérience de pensée d'Aristote, une petitesse (et une grandeur) limite(s) pour la chair, il s'en suivrait que la quantité totale de chair qui se cache dans une quantité limitée d'eau doit nécessairement être un multiple entier de cet ἐλάχιστον. Nous voyons que cette idée n'est que la conséquence directe de ce qu'il venait de dire au sujet des ὁμοιομέρειαι d'Anaxagore. C'est donc bien dans ce commentaire de Simplicius que l'on trouve les constats que, premièrement, tout matériau consiste en ἐλάχιστα de même espèce qui ont la même taille et que, deuxièmement, ces ἐλάχιστα ne sont divisibles que quant à leur grandeur; dès qu'ils sont divisés ils perdent leur nature.

Un ἐλάχιστον au sens de Simplicius est donc un véritable *individu substantiel*, c'est-à-dire la condition à la fois nécessaire et suffisante pour l'existence d'un matériau. Par le mot même il se rattache au numériquement un d'Aristote (un cheval, un homme), qui s'amasse avec ses semblables dans un agrégat pour y subsister intégralement. Cet agrégat, on le voit bien, ne saurait être un continu au sens aristotélicien. Il sera plutôt, comme on le dira beaucoup plus tard, du reste bien dans l'esprit de la *Physique* VI, 1, "un tout par contiguïté." Nous avons consulté par ailleurs le commentaire de Simplicius sur la *Physique* VI pour voir

39. Sur la personne de Thémistius, voir Blumenthal "Themistius."
40. Simplicius, *In Aristotelis Physicorum libros quattuor priores commentaria* (Diels), p. 169[16-19]: " ... ἄπειροι ἐν αὐτῷ ἔσονται τὸν ἀριθμὸν ἴσαι ἀλλήλαις· αἱ γὰρ ἐλάχισται σάρκες ἴσαι τὸ μέγεθος ἄπειροι ἐν αὐτῷ ἔσονται· τοῦτο δὲ ἀδύνατον διὰ τὸ ὡρίσθαι τὴν ἐλαχίστην σάρκα ... "
41. Hoenen, *Cosmologia*, 2e éd., p. 510.

s'il avait quelque chose à dire au sujet du rapport entre les différentes sortes de continua qu'Aristote avait distinguées.[42] Or il nous a paru que, pour l'essentiel, Simplicius y soutient la vue d'Aristote selon laquelle tout continuum (temps, grandeur, mouvement) est infiniment divisible, du moins en puissance: la notion de "sans-parties," que Simplicius prend au sens de l'"atome" d'autrefois, n'a donc pas de sens physique. Nous avons indiqué précédemment que l'ambiguïté principale dans la doctrine aristotélicienne concerne justement le fait qu'un matériau est conçu comme un continuum, ce qui n'est point réconciliable avec l'hypothèse d'ἐλάχιστα.

Malheureusement Simplicius n'a pas commenté, du moins autant que nous le sachons, le traité *De la génération*, ce qui est d'autant plus regrettable que ceci l'aurait permis d'approfondir l'aspect physico-chimique de sa prise de position, surtout pour ce qui est des particularités du processus de la *mixtion*.

## Thémistius

Remontons dans le temps à Thémistius, philosophe de Constantinople, symbole s'il y en ait du Περίπατος byzantin d'avant la renaissance du XI[e] siècle. Des ouvrages qui demandent notre attention, ce ne sont que les commentaires sur la *Physique* et sur le traité *De l'âme*, tous deux sous forme d'une paraphrase, qui ont survécu.[43] Ceux-ci, datant vraisemblablement des années 337 – 357, nous permettront cependant de vérifier les énoncés de Simplicius à propos de Thémistius, car il paraît que ce dernier a effectivement commenté le passus 187a32-188a19 où le Stagirite s'était entretenu avec Anaxagore et où Simplicius avait fait la synthèse des deux opposants. Or selon Thémistius, qui commence par résumer l'opinion d'Anaxagore, les "physiciens" d'antan avaient soutenu la subsistance des parties dans le tout en arguant que les choses provenues de contrariétés manifestent elles-mêmes des contrariétés, alors que jamais on ne voit surgir quelque chose à partir de choses non-existantes. Bref, delà les adages: "tout était ensemble" et "devenir est syncrase, périr diacrase."[44] Chez Anaxagore, Thémistius y ajoute, ce sont les ὁμοιομέρειαι qui prédominent numériquement dans un certain matériau, qui en déterminent la nature.[45] Pour ce qui est du nombre d'ὁμοιομέρειαι, il critique Anaxagore en soutenant que ce nombre ne saurait être infiniment grand: d'abord puisque ces principes sont délimités quant à leur grandeur pour des raisons à développer un peu plus loin, ensuite du fait que l'infini est inconnaissable pour l'homme.[46] Thémistius

42. Simplicius, *In Aristotelis Physicorum libros quattuor posteriores commentaria* (Diels).
43. Themistius, *In Aristotelis Physica paraphrasis* (Schenkl) et Themistius, *In libros Aristotelis De anima paraphrasis* (Heinze).
44. Themistius, *In Aristotelis Physica paraphrasis* (Schenkl), p. $13^{34-35}$: "ἦν ὁμοῦ πάντα' καὶ 'τὸ γίνεσθαι συγκρίνεσθαί ἐστι καὶ τὸ φθείρεσθαι διακρίνεσθαι."
45. *Ibid.*, p. $14^{10-12}$: "ὅτι μὴ πάντα, φησίν, ἐξ ἴσης ἐν ἑκάστῳ κατὰ τὸ πλῆθος, ἀλλὰ καθ' ἕκαστον ἕν τι πάντως ὑπερέχει καὶ πλεονάζει ... "
46. *Ibid.*, p. $14^{15-22}$.

fait ressortir aussi qu'Anaxagore s'était opposé à l'idée, que ses ὁμοιομέρειαι pouvaient adopter toute grandeur possible, dans ce sens qu'il y aurait non seulement d'ὁμοιομέρειαι infiniment petites, mais encore d'ὁμοιομέρειαι infiniment grandes.[47] Pour Anaxagore il n'y avait que d'ὁμοιομέρειαι infiniment petites. Or Thémistius, de sa part, combat cette thèse en disant à peu près que la grandeur d'un tout n'est que la sommation des grandeurs de ses parties. Si donc la chair, les nerfs et l'os pouvaient être quelconques en grandeur, le même vaudrait pour un animal ou une plante. Mais, ajoute-t-il, même Anaxagore admettait que les êtres vivants sont limités, ce qui exclut en conséquence une petitesse infinie pour les ὁμοιομέρειαι.[48] Enfin, il arrive à la prémisse d'Aristote selon laquelle, on s'en souvient, ce qui n'est pas possible pour le tout, ne l'est pas non plus pour les parties.

Or il découle du récit de Thémistius que la doctrine anaxagorienne avait été beaucoup plus compliquée que le compte rendu d'Aristote pourrait faire croire. En effet, Anaxagore n'avait pas parlé d'une seule et même espèce d'ὁμοιομέρειαι de chair, par exemple: d'après lui, la grandeur de ces ὁμοιομέρειαι ainsi que leurs différences sont en raison de l'espèce de l'animal en question. Le nombre des différentes sortes de matériaux sera donc une fonction du nombre total d'espèces d'animaux.[49]

Il n'empêche, dit Thémistius en substance, qu'il serait absurde de supposer qu'un éléphant consisterait en d'ὁμοιομέρειαι de chair plus petites, ou un moucheron en d'ὁμοιομέρειαι plus nombreuses. Du reste, il n'importera en rien de prétendre quelque chose de certain sur le nombre et la grandeur précis des ὁμοιομέρειαι dans un certain objet d'une grandeur du reste indéterminée. Tout au moins on peut soutenir que:[50]

> "En général la division à l'infini ne comporte pas la conservation de la chair; s'il n'est pas impossible de s'imaginer que la division continue à l'infini, il n'empêche que ceci est parfaitement impossible pour la chair [en tant que chair]; car la partie de chair succombait bientôt."

Or quoi qu'en dise Anaxagore, il faut que la grandeur de la plus petite partie de chair soit bien définie, en sorte qu'il est nécessairement impossible que tous les autres corps y sont encore dedans. Suit alors une paraphrase de l'argumentation d'Aristote de la *Physique* I, 4, que Thémistius arrondit avec un appel à l'impuissance divine, c'est-à-dire de "l'esprit le plus sage" [ὁ νοῦς φρονιμώτατος] d'Anaxagore,[51] de commettre des impossibilités. D'une manière générale, dit Thémistius, Anaxagore se trompait là où il soutenait que

47. *Ibid.*, p. $14^{27-31}$.
48. *Ibid.*, p. $15^{5-6}$.
49. *Ibid.*, p. $15^{15-16}$.
50. *Ibid.*, pp. $15^{31}$-$16^{2}$: "ὅλως δὲ τὸ καθαιρεῖν ἐπ' ἄπειρον σάρκα οὐδὲ σάρκα ἔτι φυλάττειν ἐστίν· ὡς μὲν γὰρ σώματος οὐκ ἀδύνατον ἐπ' ἄπειρον νοεῖσθαι τὴν τομήν, ὡς δὲ σαρκὸς ἀμήχανον παντελῶς· διαφθείρεται γὰρ οὐκ εἰς μακρὸν τὸ σαρκίον."
51. *Ibid.*, p. $17^{7-8}$.

la chair et l'or ne sont que des amas où les parties de chair et d'or, respectivement, prédominent. L'axiome selon lequel "si un corps divisible est démonté en parties, le corps original résultera de la combinaison de ces parties"[52] n'est finalement pas évident en soi. Car après tout il y a des matériaux, tel que l'argile, qui se divisent de différentes manières: ou bien en parties d'argile, ou bien en parties d'eau et de terre. Comment faudrait-il alors décrire l'argile: comme un σύνθετον de parties homoiomères d'argile, ou comme un σύνθετον de parties d'eau et de terre? Ne se pourrait-il quand même qu'il y a genèse d'argile et corruption d'eau et de terre, au sens d'Aristote? Après tout, la formation d'eau à partir de l'air ne revient pas à l'agrégation de parties d'eau d'abord dispersées dans l'air; cette formation n'est pas comparable à la construction d'une maison par l'entassement de briques. Non, ce n'est pas par syncrase, que ce processus se déroule. Avec un appel au témoignage des sens, Thémistius rallie le camp d'Aristote:[53]

> " ... nous voyons l'air se transformer et changer en eau, et c'est ainsi que l'eau naît de l'air."

Si nous avons analysé le développement de Thémistius en détail, ce n'est parce que son cas nous a paru éclairant pour les problèmes rattachés à l'étude diachronique des commentateurs grecs d'Aristote. Il s'agit plus particulièrement de la valeur des références de Simplicius au philosophe de Constantinople. En effet, les vues que Simplicius devait lui attribuer, quelque deux cents ans plus tard, ne se retrouvent pas dans le contexte original et apparemment authentique: d'après ce dernier, rien qu'un paraphrase du texte même d'Aristote, Thémistius n'a pas connu un concept d'ἐλάχιστον, moins encore une fusion de ce concept avec la notion anaxagorienne d'ὁμοιομέρεια, sous quelque forme que ce soit. Thémistius ne fait que reprendre la terminologie du Stagirite et ne lui attribue aucun élément nouveau. Ainsi on retrouve littéralement "la plus petite [partie de] chair" (ἡ ἐλαχίστη σάρξ) d'Aristote et non point l'adjectif substantivé d'ἐλάχιστον, dont Simplicius parle. Pour ce qui est de la grande innovation de Simplicius, à savoir, justement cette fusion, Thémistius apparemment n'y est pour rien.

Or, vu la fiabilité habituelle des citations — du reste nombreuses — dans les travaux de Simplicius, ceci est pour le moins embarrassant. Il est vrai que, précisément dans le fragment qui nous concerne, Simplicius ne cite pas les mots mêmes de Thémistius (ni d'ailleurs ceux d'Alexandre) et ne donne pas des renvois exacts. Enfin, notre premier souci n'a pas été de vérifier l'authenticité des références plutôt bibliographiques de Simplicius, mais de suivre la genèse d'un concept qui, incontestablement, se dessine dans son

52. *Ibid.*, p. 17[15-16]: "εἰ δέ τι φθειρόμενον διαλύεται, ἐξ ἐκείνων γίνεσθαι συντιθέμενον."
53. *Ibid.*, p. 17[22-23]: "ἀλλ' αὐτὸν μὲν ὁρῶμεν εἰς ὕδωρ μεταβαλλόμενον τὸν ἀέρα καὶ ἀλλοιούμενον καὶ τοῦτό ἐστιν ἐξ ἀέρος ὕδωρ γενέσθαι."

commentaire sur la *Physique* I, 4. Résumons donc la situation en disant que c'est bien chez Simplicius que l'on retrouve l'association de l'ὁμοιομέρεια d'Anaxagore avec l'ἐλάχιστον d'Aristote, association qui relève directement du concept d'*individu substantiel* et qui constitue à tout le moins une innovation capitale.

**Jean Philopon**

Si le dernier péripatéticien à la chaire de philosophie d'Athènes s'était présenté — du moins selon ses dires — comme l'interprête de la très riche tradition dont il était issu, Jean Philopon, professeur de grammaire à Alexandrie et pour cela surnommé le *Grammairien*, fait plutôt figure de solitaire, qui à lui seul reprenait la tâche de repenser Aristote.[54] On sait par ailleurs que Simplicius, son contemporain, ne l'appréciait pas tellement; on soupçonne que le victime principal de la fermeture de l'Académie d'Athènes, en 529, était agacé par l'habileté avec laquelle le Grammairien avait prévu et paré la menace impériale. En effet, ce dernier, oubliant ce qu'il avait professé auparavant, eut choisi un bon moment, cette même année-là, pour publier son ouvrage *Sur l'éternité du monde contre Proclus*, dans lequel il revendiqua la vérité du dogme chrétien vis-à-vis de la philosophie néoplatono-aristotélicienne. Quelques années plus tard, il renforça encore sa nouvelle position par un traité *Sur l'éternité du monde contre Aristote*. Or la critique de Simplicius, ainsi que le zèle théologique jugé néfaste de Philopon ont gâché la mémoire du Grammairien auprès de la postérité arabe et chrétienne.

Dans le domaine des sciences de la nature on est redevable à Philopon du concept d'*impetus*, concept qui sera, à la haute Scolastique, à l'origine de la nouvelle théorie du mouvement local, l'un des fleurons des écoles savantes d'Oxford et de Paris.[55] Plus tard encore, aux XVI$^{e}$ et XVII$^{e}$ siècles, ce que l'on s'était accoutumé entre-temps à considérer comme l'insurgence de Philopon envers Aristote lui valait l'estime de la nouvelle génération de savants, pour la plupart aussi solitaires que leur inspirateur alexandrin.[56]

Or concernant la doctrine des ἐλάχιστα, nous avons vu que l'un des problèmes dans l'étude de l'œuvre de Simplicius relève du fait qu'il n'a pas écrit — ou du moins l'histoire nous n'a pas laissé de sa main — un commentaire sur *De la génération*, ce qui nous empêche de nous former une idée des implications physico-chimiques de ses énoncés innovateurs sur les ἐλάχιστα. Or cet handicap n'existe pas dans le cas de Philopon; on lui connaît des analyses de presque

54. Sur la personne de Philopon, voir Sorabji (ed.), *Philoponus* et tout spécialement Sorabji, "John Philoponus," Chadwick, "Philoponus" et Hoffmann, "Simplicius' Polemics." Voir aussi Verrycken, "The Development"; l'hypothèse de Verrycken a été contestée par De Haas dans son ouvrage *John Philoponus' New Definition*, pp. 31-36 et pp. 291-293. Voir, enfin, Verbeke, "La physique d'Aristote et l'interprétation de Jean Philopon."
55. Voir Wolff, "Philoponus" et Zimmermann, "Philoponus' Impetus Theory."
56. Schmitt, "Philoponus' Commentary."

tous les traités d'Aristote en cause, analyses — à en croire Koenraad Verrycken, grand connaisseur de Philopon — au moins partiellement authentiques.[57]

Une particularité de Philopon concerne sa transition, inaugurée par la publication du traité *De l'éternité du monde contre Proclus*, en 529, d'un philosophe néoplatono-aristotélicien de souche chrétienne à un théologien apologiste acharné du Christianisme. Or il se trouve, d'après Verrycken, que c'est principalement dans le commentaire sur la *Physique*, que l'on s'aperçoit de traces de cette transition. Il s'agit surtout d'énoncés plus ou moins contradictoires au sujet de l'éternité du monde et du mouvement. Hormis la critique du cinquième élément, la théorie de la matière, plus particulièrement la sentence de la divisibilité, ne semble pas avoir été un litige en soi. C'est un constat important, nous semble-t-il, du moment où l'on veut comparer certains aspects de cette théorie dans des ouvrages de différentes époques. Dans la terminologie de Verrycken, on peut soutenir que quant à la théorie de la matière, ou plus strictement encore, quant à la divisibilité de matériaux phénoménaux, Philopon-1 = Philopon-2. C'est pour cela que nous osons aborder la pensée de Philopon par son commentaire sur la *Physique* pour voir après ce qu'il dit au sujet de la physico-chimie aristotélicienne, telle que le Stagirite l'avait résumée dans *De la génération*, I, 10. Pour terminer, nous vérifions ce que Philopon y ajoute dans *De l'âme*.

Philopon développe son analyse de la critique d'Aristote sur Anaxagore surtout dans le fragment consacré au passus 187b7-8 ("Si donc l'infini est inconnaissable en tant qu'infini ... "). Ainsi il fait valoir que si les principes des choses sont des ὁμοιομέρειαι en nombre infini, celles-ci, de par leur nombre, sont inconnaissables, puisque l'infini se soustrait à l'intelligence humaine: l'infini n'est pas dénombrable car "toujours après ce qui vient d'être atteint il y a quelque chose à trouver."[58] Encore faut-il que les choses aient des dimensions déterminées: elles ne peuvent ni accroître, ni décroître indéfiniment. La "forme" (εἶδος) de l'homme ne sauraient constituer qu'un homme d'une certaine grandeur, disons de quatre ou de cinq coudées.[59] L'homme ne saurait être indéfiniment petit: le navire en bois fait par un artisan, ou l'amphore du potier ne le saurait pas non plus. Ce qui vaut pour les choses dans leur entièreté vaudra également pour leurs composants. Après tout, les ὁμοιομέρειαι ont également une certaine forme:[60]

57. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria, In Aristotelis De anima libros commentaria, In Aristotelis Physicorum libros tres priores commentaria* et *In Aristotelis Physicorum libros quinque posteriores commentaria.*
58. Johannes Philoponus, *In Aristotelis Physicorum libros tres priores commentaria* (Vitelli), p. $96^{19}$: "ἀεὶ ἔξω τι τοῦ ληφθέντος ἔστιν εὑρεῖν ... "
59. *Ibid.*, p. $97^{2-4}$.
60. *Ibid.*, p. $97^{21-23}$: "ἔστι τι πάντως μέγεθος, οὗ ἐν τῷ ἐλάττονι οὐκ ἂν συσταίη τὸ εἶδος τῆς σαρκός. ἔστιν ἄρα τις ἄτομος καὶ ἐλαχίστη σάρξ. ὁμοίως καὶ ἐπὶ παντὸς ὁμοιομεροῦς."

> " ... il y a absolument une certaine grandeur en-deça de la quelle la forme [τὸ εἶδος] est incapable de constituer la chair. Il y a alors un certain morceau minimal et indivisible de chair. Semblablement chez tous les matériaux homoiomères."

Tous les corps composés ne proviennent pas au hasard d'une quelconque quantité de matière; c'est la forme qui exige une quantité bien déterminée[61] et ceci tiendra également pour les quantités des éléments qui vont constituer la chair ou l'os:[62]

> " ... la forme de la chair demande un certain mélange sousjacent, celle de l'os un autre, et un autre pour les autres."

S'il est ainsi, il y a pour ces formes des corps composés non seulement une certaine qualité, c'est-à-dire un certain mélange — disons une certaine proportion — des éléments, mais aussi une certaine grandeur:[63]

> "Il y a donc des parties minimales de la chair et de l'eau telles que les formes ne sauraient constituer des quantités plus petites."

Devant ces mêmes choses les mathématiciens sont dans l'embarras, poursuit Philopon. Car puisque toute grandeur en tant qu'espace géométrique soit infiniment divisible, une partie minimale de chair peut être divisée forcément, mais de quelle nature seront ses parties? Si les nouvelles parties sont de chair, le morceau original n'était point un ἐλάχιστον. Mais si ces mêmes parties ne sont pas de chair, la question se lève comment celles-ci pourront éventuellement reconstituer la chair? D'autre part, si la chair est vraiment ὁμοιομερής, il va de soi que toutes les parties sont de chair. Un morceau de chair peut donc subir la fission d'un double point de vue:[64]

> "Comme grandeur justement la chair est infiniment divisible (parce qu'il n'y a pas un minimum de grandeur), en tant que quelque chose ayant une forme, il ne lui est évidemment point possible d'être divisé à l'infini, mais elle cesse complètement d'être dès que le minimum est atteint, et au cas où nous effectuons la division, nous détruirons, par cette division même, aussitôt tout à la fois la forme de chair."

Philopon compare la fission d'un minimum de chair avec la fission d'un homme, car l'homme et ce minimum sont tous deux pareillement indivisibles.[65] Car si déjà la fission d'un homme ou d'un minimum de chair donne des parties, on est quand même dans l'impossibilité de s'en servir pour reconstituer l'homme en question, faute de forme.[66] C'est un peu comme vouloir construire un navire

61. *Ibid.*, p. $97^{24-27}$.
62. *Ibid.*, p. $97^{28-30}$: " ... ] τὸ μὲν τῆς σαρκὸς εἶδος δεῖται τοιᾶσδε κράσεως ὑποκειμένης, ἑτέρας δὲ τὸ τοῦ ὀστοῦ, καὶ ἄλλο ἄλλης."
63. *Ibid.*, p. $98^{5-7}$: "ἔστιν ἄρα τις ἐλαχίστη σὰρξ καὶ ἐλάχιστον ὕδωρ, οὗ ἐν ἐλάττονι μεγέθει οὐκ ἂν συσταίη τὰ εἴδη ταῦτα."
64. *Ibid.*, p. $98^{22-26}$: "ὡς μὲν οὖν μέγεθος οὖσα ἡ σὰρξ ἐπ' ἄπειρόν ἐστι διαιρετή (διὸ οὐδὲ ἔστι λαβεῖν ἐλάχιστον μέγεθος), ὡς μέντοι εἶδός τι οὖσαν οὐκέτι δυνατὸν ἐπ' ἄπειρον διελεῖν, ἀλλὰ πάντως καταλήξει εἴς τινα ἐλαχίστην σάρκα, ἣν ἐὰν διέλωμεν, εὐθὺς ἅμα τῇ διαιρέσει τὸ τῆς σαρκὸς ἐφθείραμεν εἶδος."
65. *Ibid.*, p. $98^{26-33}$.
66. *Ibid.*, pp. $98^{33}$-$99^{3}$.

ou une maison par l'amoncellement en aveugle de bois et de pierres, sans l'entremise du savoir faire de l'artisan. Dans le cas de la chair, c'est le savoir faire de la nature qui compte. Or:[67]

> "Le minimum de chair est donc homoiomère, mais seulement pour autant que la totalité est sauvée."

Le lecteur moderne est séduit par la profondeur et par la consistance même du développement de la pensée de Philopon. Il est non seulement question, on s'en rend compte vite, d'un nouveau concept en tant que tel. Car c'est bien le concept d'*individu substantiel* qui est détaillé ici sous forme d'une comparaison suivie avec l'être humain. Il est clair en même temps que déjà le train des idées de Philopon dépasse de beaucoup celui de Simplicius, qui, lui, en arrivant à la même nouveauté, était resté pour ainsi dire dans les catégories de la tradition philosophique d'entre Anaxagore et Aristote. Or le plus remarquable chez Philopon est que celui-ci avait parfaitement compris que son approche revenait à une voie nouvelle, à une refonte de la base même de la philosophie naturelle. Lisons de plus près ce qu'il en écrit exactement:[68]

> "Il est ainsi, d'une part, que le plus générique et le plus communément répandu parmi les êtres, tous comptés, est par exemple l'être et l'unité ... et, d'autre part, que les formes qui sont appelées indivisibles relèvent des catégories, parce qu'elles représentent le plus individuel en tant qu'elles participent aux idées; et que ce n'est pas d'après la pluralité que les catégories s'appliquent (mais l'homme d'après un seul homme, et le cheval d'après un seul cheval), ni d'après ce qu'ils présentent par hasard. Car un homme mort n'est pas homme, et une partie d'un homme n'est plus homme. *La chair et l'os et les corps homoiomères constituent un ordre intermédiaire*, car c'est d'une part d'après le plus petit que l'existence et l'unité se présentent, et d'autre part sous l'aspect de la pluralité que la forme indivisible se manifeste. C'est que la chair et l'os se disent non seulement des chevaux et des autres animaux, mais également de leurs parties, ce qui bien entendu ne vaut point pour les parties du minimum de chair ou d'os, lorsqu'il est divisé. Toutefois quand ni la chair, ni l'os, ni aucun des mêmes [en tant que masses] ne s'affirment plus, l'être et l'unité y sont pas moins [dans l'ἐλάχιστον invisiblement petit]. Si d'autrepart les parties du minimum de chair ne sont pas de chair, ce sont quand même des êtres: parce qu'il y a des grandeurs et des corps."

Si Philopon n'arrive pas à la conclusion que l'idée d'ἐλάχιστον représente en soi une nouvelle catégorie, une nouvelle manière de considérer le monde, il

67. *Ibid.*, p. 99[7-8]: "ὁμοιομερὴς δὲ καὶ ἡ ἐλαχίστη σάρξ, ἀλλ' ἐν ὅσῳ σῴζει τὴν ὁλότητα."
68. *Ibid.*, p. 99[11-25]: "τὰ μὲν γάρ ἐστι τῶν ὄντων γενικώτατα καὶ κοινότατα ἐπὶ πάντων τῶν ὄντων ἐκτεταμένα, οἷον τὸ ὂν καὶ τὸ ἕν ... , τὰ δὲ ἄτομα καλούμενα εἴδη ἐστένωται ταῖς κατηγορίαις διὰ τὸ μερικώτατα ὡς ἐν εἴδεσιν εἶναι, καὶ οὔτε ἐπὶ πλειόνων ἐστὶ κατηγορούμενα (ἀλλ' ὁ ἄνθρωπος ἐπὶ μόνων ἀνθρώπων, ὁ δὲ ἵππος ἐπὶ ἵππων), οὔτε ἐφ' ὧν κατηγορεῖται ὡς ἔτυχεν ἐχόντων· οὔτε γὰρ ὁ νεκρὸς ἄνθρωπος ἄνθρωπος, οὔτε τὸ μόριον τοῦ ἀνθρώπου ἔτι ἄνθρωπος. σὰρξ δὲ καὶ ὀστοῦν καὶ τὰ ὁμοιομερῆ μέσην τάξιν ἔχοντα ἐπ' ἐλαττόνων μέν ἐστιν ἢ τὸ ὂν καὶ τὸ ἕν, ἐπὶ πλειόνων δὲ ἢ τὰ ἄτομα εἴδη· σὰρξ μὲν γὰρ καὶ ὀστοῦν καὶ ἐπὶ ἵππου καὶ ἐπὶ τῶν ἄλλων ζῴων κατηγορεῖται καὶ ἐπὶ τῶν μορίων αὐτῶν, οὐκέτι μέντοι καὶ ἐπὶ τοῦ μορίου τῆς ἐλαχίστης σαρκὸς ἢ τοῦ ὀστοῦ, ὅταν διαιρεθῇ. τότε γὰρ σὰρξ μὲν ἢ ὀστοῦν οὐκέτ' ἂν αὐτῶν κατηγορηθείη, τὸ μέντοι ἓν καὶ τὸ ὂν οὐδὲν ἧττον. εἰ γὰρ καὶ μὴ σάρκες εἰσὶ τὰ μόρια τῆς ἐλαχίστης σαρκός, ἀλλ' οὖν ὄντα ἐστί· μεγέθη γάρ εἰσι καὶ σώματα." [dans la traduction, c'est nous qui soulignons].

n'empêche qu'il est bien conscient du fait qu'au sujet de la masse d'ἐλάχιστα, la doctrine des catégories fait défaut. La logique prédicative, celle des catégories d'Aristote, se rattache aux entités individuelles appartenant le plus souvent à des pluralités, à des espèces. Jamais les prédicats qui définissent l'espèce et partant les particularités des individus qui y appartiennent sont empruntés à une masse, du seul fait de l'imperceptibilité des individus qui s'y sont rassemblés. Dans l'hypothèse des ἐλάχιστα, il se pourrait fort bien que les prédicats associés à la masse ne correspondent guère avec ceux de ses constituants. Cette manière de voir certaines choses est entièrement nouvelle. Philopon en est conscient, nous semble-t-il, qui proclame dans le fragment que nous venons de citer, que les corps homoiomères en tant qu'amas sont d'un "ordre intermédiaire" (μέση τάξις). En effet, ils se situent en quelque sorte *entre* les choses non-existantes (sans être et sans unité) et les choses réelles, dont les prédicats spécifiques se déduissent des individus, tout en valant éventuellement pour une masse d'individus rassemblés.

C'est du point de vue de cet "ordre intermédiaire" que Philopon va, par la suite, interpréter la pensée d'Aristote. Ainsi il soutient que tout corps délimité se mesure en d'autres corps plus petits, mais également délimités. Il en conclut que la sentence anaxagorienne que tout est dans tout est nécessairement fausse, car la quantité de chair qui serait dans l'eau, par exemple, devrait être un multiple entier de l'ἐλάχιστον, qui en est en quelque sorte l'étalon.[69] Ce même argument s'oppose à la supposition que toute chose contiendrait une infinité d'espèces de parties, chacune en nombre infini, donc une infinité multipliée par une infinité.[70] Aristote avait raison, dit Philopon, là où il objectait à Anaxagore que même l'*esprit* gouvernant le monde ne saurait faire ce qui est impossible. Le Grammairien y ajoute qu'encore il n'est pas juste de soutenir, comme l'avait fait Anaxagore, que les corps proviennent de choses semblables: si l'argile résulte d'abord de parties argileuses, il demeure que celles-ci proviennent en dernière instance de terre et d'eau. Ceci vaut semblablement pour les choses naturelles que pour les choses artificielles: après tout le bois donne le feu et l'eau donne l'air, alors qu'une maison se construit à partir de planches et de briques.[71]

Rappelons la question que s'était posée Anaxagore, à savoir: "comment le cheveu proviendrait-il de ce qui n'est pas cheveu et la chair de ce qui n'est pas chair?"[72] Il avait répondu, on le sait bien, en disant que le nombre d'espèces d'ὁμοιομέρειαι égalait le nombre de matériaux dans l'univers. Or, si Philopon n'approfondit pas tellement son sentiment sur ce point, il est néanmoins probable que ce qu'il dit des corps bruts (argile, bois, eau) a trait à leurs ἐλάχιστα: ce sont

69. *Ibid.*, pp. $99^{26}$-$100^{21}$.
70. *Ibid.*, pp. $100^{28}$-$101^{4}$.
71. *Ibid.*, p. $101^{5-28}$.
72. *Die Fragmente der Vorsokratiker* (Diels e.a.): Anaxagoras, fragment B.10: "πῶς γὰρ ἄν ... ἐκ μὴ τριχὸς γένοιτο θρὶξ καὶ σὰρξ ἐκ μὴ σαρκός;"

eux qui se composent, comme il l'avait remarqué lui-même auparavant, à partir des quatre éléments, unis dans une certaine proportion. Il y a apparemment une hiérarchie de matériaux: les quatre éléments composent, par exemple, le feu, qui, lui, constitue avec d'autres corps (éléments ou non) le bois. C'est précisément ce feu disons phénoménal qui s'échappe du bois brûlant (et qui sans doute sera très riche en feu élémentaire).

Dans le commentaire sur le passus 187b13-16, consacré au rapport de grandeur entre les parties et le tout, Philopon déclare avec Aristote que tout objet et partant tout matériau le composant connaît non seulement un minimum de grandeur, mais également un maximum. Or comme tout matériau est présenté comme un amas d'ὁμοιομέρειαι, les limites sont déterminées par la grandeur de l'ἐλάχιστον et par son nombre. Il ne se permet toutefois pas de précisions.[73] Le commentaire sur le reste de la *Physique* I, 4 ne contribue guère à une meilleure compréhension de la doctrine des ἐλάχιστα: il s'agit le plus souvent d'explications tout court du texte d'Aristote.

Il serait intéressant de comparer la doctrine des ἐλάχιστα du commentaire sur la *Physique* I, 4 avec celle concernant la nature des continua en général, telle qu'Aristote l'avait précisée dans le sixième livre de la *Physique*. Or il se trouve que nous ne possédons que des extraits du commentaire en question et le peu que l'on peut en déduire c'est que Philopon croit, avec Aristote, que le continuum (temps, grandeur et mouvement) est infiniment divisible et qu'il n'est point composé de "sans-parties" ou d'ἐλάχιστα;[74] un ἐλάχιστον est présenté comme "la limite de ce qui relève de la grandeur."[75] Cette dernière définition renvoit vraisemblablement à son analyse de deux passus de la *Physique* III, 7, où Aristote s'était servi du mot ἐλάχιστον pour indiquer le plus petit, la μονάς, dans le domaine des nombres. Une telle μονάς, en tant qu'unité, est indivisible. C'est comme chez le *genre* des animaux qui est bien un, mais se divise tout de même en *espèces*. Ainsi, un *continuum* est pareil à un *genre*: il est indivisible en tant que *continuum*, comme par exemple le bois et la pierre. Ces derniers sont à la fois une *unité* et, du moins en puissance, une *pluralité*.[76] Du point de vue de ses énoncés dans le cadre de la *Physique* I, 4, il est par ailleurs étonnant de constater que Philopon ne situe pas le rapport entre les *continua* et leurs parties sur le niveau du rapport entre les *espèces* des êtres vivants et ce que nous autres modernes aurions appelé les *individus*.

Passons maintenant à son analyse du traité *De la génération*. Remarquons d'abord que ce traité concerne selon les mots mêmes de l'auteur des "annota-

73. Johannes Philoponus, *In Aristotelis Physicorum libros tres priores commentaria* (Vitelli), pp. 102-104.
74. Johannes Philoponus, *In Aristotelis Physicorum libros quinque posteriores commentaria* (Vitelli), p. $809^{9-13}$; voir aussi p. $815^{7-8}$, et p. $820^{4-9}$.
75. *Ibid.*, p. $815^{21}$: " ... τὸ πέρας τῶν ἐν τῷ μεγέθει."
76. *Ibid.*, p. $487^{26-28}$: "φημὶ οὖν ὅτι καὶ τὸ γένος καὶ τὸ συνεχὲς οὐ μόνον ἕν ἐστιν, ἀλλὰ καὶ δυνάμει πολλά."

tions prises pendant les réunions avec Ammonius, fils d'Hermeias ... ," et date probablement d'entre 510 et 517 A.D., en tout cas d'avant le commentaire sur la *Physique*.[77] Le ton y est en effet tout autre. Si l'on retrouve par-ci et par-là quelques précisions intéressantes de la pensée du Stagirite, elles demeurent bien dans les bornes du texte original. L'auteur donne des citations littérales et parafrase amplement les dictes d'Aristote. Ceci contraste assez vivement avec l'abondant témoignage d'indépendance que l'on se souvient du commentaire sur la *Physique* I, 4.

La partie du traité *De la génération* qui nous intéresse ici principalement, c'est le dixième chapitre du premier livre, où Aristote avait développé ce qu'il faudrait entendre par *mixtion* et par le double processus de *génération et de corruption*. Or la doctrine du Stagirite revient à dire que la nature d'un changement physico-chimique dépend des forces relatives des matériaux réagissants. Réagir, c'est à la fois agir et pâtir. Si l'un des matériaux réagissants est beaucoup plus fort que l'autre, il le transforme entièrement dans sa nature: le corps le plus faible périt, alors qu'une nouvelle quantité du plus fort surgit et s'ajoute à la quantité déjà présente. Ceci sera un cas du double processus. Un cas de *mixtion* se présente lorsque les pouvoirs des matériaux réagissants se contrebalancent si bien qu'une sorte de moyenne en résulte, un corps qui quant à ses propriétés tient le milieu entre tous les réactants. Quant aux annotations d'Ammonius-Philopon, deux choses sollicitent notre attention: à savoir, son opinion sur la nature du continuum matériel, plus précisément sur sa divisibilité et, en corollaire, celle sur l'agencement des processus physico-chimiques.

Sur la question d'Aristote s'il existe véritablement un processus digne d'être appelé *mixtion*, Ammonius-Philopon répond d'abord par la considération de deux cas hypothétiques. Premièrement, un processus s'effectuant par la division des corps réactifs en parties imperceptiblement petites suivie de la juxtaposition de ces dernières, comme le mélange de la fleur de la farine du froment avec de la farine d'orge. Devant le sens de la vue ce mélange semble uniforme et on serait tenté de parler d'un véritable processus de *mixtion*, si ce n'est qu'un Lyncée pourrait percevoir les différentes parties. Deuxièmement, il se pourrait aussi que les (formes des) matériaux ne sont pas conservé(e)s et que c'est ainsi que les éléments qui les composent sont divisés en leurs particules ultimes, à savoir les atomes des atomistes. Ainsi, le mélange s'effectue par un regroupement de ces atomes. On pourra comparer ce cas avec la construction d'une maison à partir des briques provenant du démontage d'un théatre.

Or selon Ammonius-Philopon, Aristote se serait opposé à ces deux manières de considérer la nature d'un processus de *mixtion*. D'un côté, puisqu'une simple juxtaposition ne saurait être une véritable *mixtion*; de l'autre côté, parce que

77. Pour la datation des travaux de Philopon voir Sorabji, "John Philoponus" et Verrycken, "The Development"; pour un bilan récent, voir De Haas, *John Philoponus' New Definition*, pp. xii-xvii.

tout matériau est considéré comme infiniment divisible, tout comme les autres continua. Après tout, lorsqu'on ajoute de l'eau à une quantité de vin, le produit, le crama, n'est point une juxtaposition de vin et d'eau, mais résulte d'une véritable *mixtion* ou *crase*; inversément, on ne dit pas non plus qu'une maison naît d'une *mixtion* ou *crase* de pierre, de bois et des autres matériaux. Bref: la sentence de la continuité exclut les deux premières manières hypothétiques. Ce qui, pour nos sens, a toute l'apparence d'un continuum, ne sera pour un Lyncée, dans l'une comme dans l'autre des deux hypothèses envisagées au début, un monceau discontinu.[78]

Remarquons qu'Ammonius-Philopon ne distingue pas un niveau intermédiaire entre les atomes et, par exemple, les grains de la fleur de farine. Il est cependant intéressant de lui voir considérer la division ultime comme une dispersion des atomes des éléments (feu, eau).

Là où Aristote avait nié que les matériaux puissent être divisés jusqu'en leurs particules minimales,[79] Ammonius-Philopon fait voir que la négation de l'identité de *synthèse* et de *mixte* semble avoir été, pour Aristote, la conséquence de cette division irréalisable. Comme d'ailleurs soutenir qu'une chose n'est pas divisible, chez le Stagirite, revenait à énoncer qu'elle ne saurait être divisée en minima. Enfin, dire que *synthèse* n'est pas *mixtion* correspond à dire que les choses mélangées ne subsistent qu'en puissance, ce qui serait simplement le propre du processus de *mixtion*. Le produit de la *mixtion*, s'il se trouve que ce processus existe vraiment, est tel que toutes les parties ont le même rapport avec le tout.[80] Suivent alors des précisions sur l'agir et le pâtir des corps et la critique de certains phénomènes qui pourraient être décrits en termes de *mixtion*. Il faut des corps actifs et passifs et ceux-ci devront être facilement divisibles et, si cela se peut, déformables, comme les liquides. Le fait que les corps réagissent mieux et plus vite s'ils sont divisés en petites particules relève de ce qu'ils se touchent mieux.[81] Enfin, Ammonius-Philopon arrive à la même conclusion qu'Aristote, savoir, premièrement qu'il y a effectivement un processus digne du nom de *mixtion* et deuxièmement que celui-ci implique l'unification de choses qui ont changées.[82]

Or il est clair que la préoccupation principale du commentateur concerne la sauve garde du texte même. Les allusions aux ἐλάχιστα d'Aristote ne sont pas approfondies. Si Ammonius-Philopon parle d'atomes, il les présente comme la solution des atomistes. Toutefois il ne discute pas leur rapport avec les ἐλάχιστα et le lecteur enthousiaste du commentaire sur la *Physique* reste un peu sur sa

78. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), pp. $192^{19}$-$194^{15}$.
79. Aristoteles, *De generatione et corruptione*, I, 10, 328a5-6.
80. Johannes Philoponus, *In Aristotelis libros De generatione et corruptione commentaria* (Vitelli), pp. 195-196.
81. *Ibid.*, pp. 199-202.
82. *Ibid.*, p. $203^{9}$: "τουτέστι δι' ἀλλοιώσεως ἕνωσις."

faim. Pour ce qui est du traité *De la génération*, ce n'est qu'au regret que ce lecteur constate que le Philopon savant n'a pas pu refaire le travail du Philopon étudiant.

## Conclusions

Si Peter Hoenen S.J. et Andreas van Melsen ont justement salué la naissance de la doctrine de *minima naturels* dans le cercle des commentateurs grecs d'Aristote et bien comme élaboration de la doctrine plus large de maxima et de minima remontant à Aristote lui-même, nombreux aspects ont jusqu'ici resté inaperçus, ou du moins n'ont pas reçu l'attention qu'ils méritent. Mentionnons d'abord le fait que la notion hybride conçue par Simplicius ne se réfère non seulement à la "limite en de-ça de laquelle un matériau perd son caractère," mais relève manifestement de l'idée de l'*individu substantiel*. Pour lui en effet tout matériau à notre échelle n'est qu'un amas d'ὁμοιομέρειαι de même espèce et de dimensions finies et égales.

L'idée de l'*individu substantiel* paraît par conséquent un acquis du VI^e^ siècle de notre ère. On la rencontre également et sous une forme beaucoup plus détaillée encore dans les commentaires de Philopon. Chez ce dernier les ἐλάχιστα sont des *substances* au même titre que les animaux et les plantes, plus particulièrement que l'homme, donc des unités de *matière* et de *forme*, auxquelles devraient s'appliquer les catégories d'Aristote. Pourtant du fait qu'ils sont imperceptiblement petits et qu'ils ne se présentent à l'intelligence humaine que sous forme d'agrégats d'une taille et d'une figure plus ou moins fortuites, ils se soustraient en quelque sorte aux catégories traditionnelles. Ainsi les matériaux en tant qu'amas d'une pluralité de *substances* imperceptiblement petites représentent un "ordre intermédiaire" (μέση τάξις). Quoique les *substances* composantes soient les véritables unités, leur existence ne saurait être constatée qu'indirectement, presque par accident, savoir par le détour de l'agrégat. Il serait alors dans la logique de Philopon de reconnaître qu'il y a des ἐλάχιστα inconnaissables faute d'amas perceptibles.

Concluons alors en disant que si les théories d'Isaac Beeckman (1620) et de Sébastien Basson (1621) préfigurent sans contredit le molécularisme des XVIII^e^, XIX^e^ et XX^e^ siècles, il n'empêche que l'idée plus générale de l'*individu substantiel*, qui a en quelque sorte présidée à ce développement, est beaucoup plus ancienne.

# Le *De generatione et corruptione* d'Avicenne dans la tradition latine

*Simone van Riet* †

## I

Le titre du traité révèle d'emblée sa place dans l'ordre de lecture des diverses matières que comporte le "Livre de la Guérison," "somme" de philosophie d'Avicenne connue en arabe sous le titre de *Kitāb al-Shifā'*.

Traduisant fidèlement le titre du traité arabe, le traité s'intitule en latin *Liber tertius naturalium De generatione et corruptione*, c'est-à-dire que "la génération et la corruption" est la troisième matière à étudier dans la philosophie de la nature ou *naturalia*. De quoi traitent la deuxième matière et la quatrième matière encadrant la troisième? Dans le *Shifā'*, le *Liber secundus naturalium* est le *De caelo*, le *Liber quartus* est le *De actionibus et passionibus qualitatum primarum*. C'est, en effet, dès la fin du *De caelo* et jusqu'à la fin du *De actionibus et passionibus* qu'est développée l'étude des quatre corps simples (les éléments) et celle de leurs quatre qualités (chaleur, froid, humidité, sécheresse). Cette étude est introduite, dans le *Shifā'*, par le *Liber primus naturalium* traitant de "ce qui est commun aux choses naturelles," *de his quae sunt communia naturalibus*.[1]

La connexion fermement établie entre les trois traités concernant les éléments et leurs qualités premières d'une part, et d'autre part entre ce groupe des trois traités et l'introduction générale à la philosophie naturelle, respecte la structure et la succession des traités grecs comme les conçoit Aristote. En effet, Aristote lui-même indique comment il relie ces diverses matières dans le "programme de recherche" qu'il énonce dès les premières lignes des *Météorologiques* I, 338a20-25: "Nous avons traité précédemment des causes premières de la nature, de tout ce qui concerne le mouvement naturel, de la translation ordonnée des astres dans la région supérieure, des éléments cor-

1. Sur le titre et l'objet des huit matières que comporte, dans le *Shifā'* d'Avicenne, la *scientia naturalis*, voir Avicenna, *Liber de anima* (Van Riet), pp. $9^{4}$-$13^{62}$. Les quatre premières des huit matières y sont résumées et ordonnées comme suit (p. $9^{4-11}$): "Iam explevimus in primo libro verbum de his quae sunt communia naturalibus; cui consequenter adiunximus librum secundum, qui est de cognitione corporum et formarum et primorum motuum in mundo naturae, et certificavimus dispositiones corporum quae non corrumpuntur et eorum quae corrumpuntur. Post hunc autem ordinavimus tractatum de generatione et corruptione et de earum subiectis. Deinde annexuimus verbum de actionibus primarum qualitatum et earum passionibus et de complexionibus quae generantur ex eis."

porels, de leur nombre, leurs qualités, leurs transformations réciproques, et enfin de la génération et de la corruption considérées sous leur aspect général";[2] suit alors (338b18-339a5) l'annonce du contenu des *Météorologiques*.

Une différence notoire apparaît entre le "programme de recherche" récapitulé ici par Aristote et l'ordre de lecture qu'expriment les titres des traités avicenniens de la *scientia naturalis* dans le *Shifā'*. C'est que, en détaillant les matières qui feront l'objet des *Météorologiques*, Aristote s'en tient, de fait, aux trois premiers des quatre livres contenus dans ce traité; d'où le problème, souvent discuté, de la place du Livre IV dans les *Météorologiques* d'Aristote. Alexandre d'Aphrodisias déjà faisait remarquer que la matière de ce Livre IV devrait précéder, et non suivre, celle des Livres I-III. L'étude des qualités premières, objet du Livre IV, serait ainsi rattachée directement au *De generatione et corruptione*, et non à l'objet des Livres I-III des *Météorologiques*.[3]

Ceci montre que l'ordre de lecture révélé par les intitulés des quatre premiers traités relatifs à la philosophie de la nature dans le *Shifā'* d'Avicenne reflète fidèlement une forme de succession des traités d'Aristote agrée par des commentateurs grecs éminents. Le *De generatione et corruptione* d'Avicenne prend donc place dans la transmission de ce traité avec toute l'autorité que lui confère, depuis Aristote, l'ancienneté *et* de sa matière spécifique *et* de son contexte.

## II

Le *De generatione et corruptione* d'Avicenne appartient à la branche arabo-latine de la transmission de l'héritage aristotélicien à l'Occident médiéval.

De quelles sources arabes Avicenne disposait-il, peu après l'an mil, pour connaître et commenter les thèmes du traité d'Aristote sur la génération et la corruption? Le célèbre *Catalogue* du libraire Ibn al-Nadīm, dressé avant 990, fait état d'au moins trois traductions vers l'arabe, dont une remonte explicitement au syriaque. Sont accessibles en arabe, non seulement le traité même d'Aristote, mais aussi les commentaires des plus célèbres interprètes grecs de la pensée d'Aristote: Alexandre d'Aphrodisias (qui enseigne à Athènes sous Septime Sévère vers 200), Thémistius (ami de l'empereur Julien, qui enseigne à Constantinople vers 350), Olympiodore et Jean Philopon (de l'école d'Alexandrie,

2. Aristote, *Météorologiques* (Louis), p. 2.
3. "Le problème du Livre IV" constitue une des questions traitées par P. Louis dans son introduction à la traduction française des *Météréologiques* d'Aristote, pp. X-XVIII. L'opinion d'Alexandre d'Aphrodisias y est citée selon le MS Paris, Bibliothéque Nationale, gr. 1880, fol. 115. Le commentaire d'Alexandre sur les *Météréologiques* d'Aristote pouvait se lire dès 1260 en une traduction latine attribuée à Guillaume de Moerbeke. Le Livre IV de cette traduction latine dit: "Quartus inscriptus Aristotelis Meteorologicorum est quidem Aristotelis, non tamen meteorologici negotii: non enim illius propria quae dicuntur in ipso; magis autem, quantum ad ea quae dicuntur, esse utique consequens his quae De generatione et corruptione"; voir Alexandre d'Aphrodisias, *Commentaire sur les Météores d'Aristote* (Smet), p. 281$^{2-6}$. Voir aussi Junceda, "Los *Meteorologica* de Aristotele," p. 43 et p. 60.

VIe siècle).[4] On pourrait reprendre ici, de la même manière et d'après le même *Catalogue,* les renseignements d'Ibn al-Nadīm sur les traités d'Aristote constituant le contexte immédiat du *De generatione et corruptione* (*De caelo, Météorologiques*) et sur l'introduction générale à la philosophie de la nature.[5]

Les données du *Catalogue* ont été largement utilisées et appréciées par des auteurs arabes postérieurs à Ibn al-Nadīm, mais aussi par les éditeurs du texte grec des traités d'Aristote et de ses commentateurs, traités pour lesquels les traductions syriaques et arabes sont les plus anciens témoins indirects. Avicenne lui aussi pouvait, à son époque, disposer des instruments arabes nécessaires à une bonne connaissance du texte d'Aristote; il pouvait en outre disposer des matériaux fournis par les commentateurs grecs et empruntés par eux au stoïcisme et au néoplatonisme, matériaux orientant en diverses directions, au risque de le gauchir parfois, le texte aristotélicien qui s'y prête par sa densité même.

## III

Le texte arabe du *De generatione et corruptione* d'Aristote fut traduit en latin à Tolède, pendant la seconde moitié du XIIe siècle, par Gérard de Crémone (†1187); une édition critique de cette traduction est en cours d'élaboration en même temps que celle du texte arabe. Gérard traduisit aussi le *De Caelo* et les trois premiers livres des *Météorologiques*, mais non le quatrième qui, on l'a dit, se rattache pourtant immédiatement à la matière du *De generatione et corruptione*.[6]

Bien que Gérard, traducteur d'Aristote, compte tout autant parmi les traducteurs d'Avicenne (il traduisit, par exemple, le *Canon de médecine*), il n'a pas entrepris la traduction latine du *De generatione et corruptione* d'Avicenne, ni celle des traités avicenniens constituant son contexte (*De caelo, De actionibus et passionibus*). Il fallut attendre près d'un siècle après la mort de Gérard pour que, entre 1274 et 1280, la traduction en fût entreprise à Burgos sous les auspices du prélat Don Gonzalo Garcia Gudiel, avant son élection au siège de Tolède (1280), et élaborée par une équipe de deux traducteurs, maître Jean Gonsalvez de Burgos et Salomon.[7]

Entré tardivement, vers la fin du XIIIe siècle, dans le répertoire latin des sources philosophiques disponibles, le *De generatione et corruptione* d'Avicenne n'a pu être utilisé — ni donc cité — par des auteurs se référant

4. Cf. Ibn al-Nadīm, *The Fihrist* (Dodge), II, p. 604.
5. Cf. *ibid.*, II, pp. 602-604.
6. P. L. Schoonheim, qui a publié déjà le texte critique de la traduction arabo-latine du Livre I des *Météorologiques* d'Aristote faite par Gérard de Crémone, précise que Gérard n'a traduit que le premier chapitre du Livre IV; voir *Aristoteles' Meteorologie* (Schoonheim), I, pp. 20-22.
7. Cf. d'Alverny, "Avicenna Latinus," pp. 286-287; Avicenna, *Liber tertius naturalium* (Van Riet), pp. 67*-68*.

pourtant couramment à Avicenne, tels Thomas d'Aquin (†7 mars 1274) et Albert le Grand (†15 nov. 1280).

Des voies indirectes pouvaient néanmoins donner accès, avant 1280, au *De generatione et corruptione* latin d'Avicenne, pour des points particuliers de sa doctrine.

Telle est, d'abord, dès le XIIe siècle, la traduction latine du traité d'Algazel *Les intentions des philosophes*,[8] élaborée à Tolède par un contemporain de Gérard de Crémone, l'archidiacre Dominique Gundisalvi ou Gundissalinus. On peut y lire un excellent résumé des thèmes principaux de la philosophie avicennienne de la nature.[9] D'où l'appellation souvent utilisée pour désigner Algazel: il est l'"abbreviator Avicennae."

Une deuxième voie d'accès menant, en latin, avant 1280, à certains thèmes du *De generatione et corruptione* d'Avicenne sont les traités d'Averroès, exégète d'Aristote. On ne possède pas en latin, pour l'étude de la génération et de la corruption, les trois types de commentaires que l'on connaît d'Averroès pour d'autres traités d'Aristote (grand commentaire, commentaire moyen, épitomé). Pour le *De generatione et corruptione*, le grand commentaire est perdu; de l'épitomé, on ne possède en latin qu'une traduction du XVIe siècle; le commentaire moyen est daté de 1172 selon la chronologie traditionnelle des oeuvres d'Averroès; la traduction en est attribuée, sans certitude, à Michel Scot et aurait été faite vers 1230.[10]

Une troisième voie d'accès, singulièrement féconde parce qu'elle met en valeur plusieurs doctrines du *De generatione et corruptione* d'Avicenne-philosophe, est le *Canon* d'Avicenne-médecin, accessible dès le XIIe siècle dans la traduction latine de Gérard de Crémone.[11]

## IV

La "carrière" médiévale latine du traité d'Avicenne sur la génération et la corruption est inaugurée vers 1280, sous d'heureux auspices, on l'a dit: patronage et mécénat d'un évêque de Burgos, bientôt élu archevêque de Tolède. Ce traité plonge ses racines dans un sol d'une antique noblesse, enrichi par les alluvions de plusieurs cultures et par les greffes de plusieurs systèmes philosophiques entées sur le tronc aristotélicien, sans oublier que l'Islam colore de sa note particulière le paysage où se meut Avicenne, l'auteur.

Or la pauvreté de la tradition manuscrite du traité est déconcertante. On n'en trouve répertorié qu'un seul manuscrit, conservé à la Bibliothèque Vaticane

8. Algazel, *Maqāsid Al-Falāsifa* (Alonso y Alonso); Avicenna, *Liber de anima* (Van Riet), p. 99*, note 26.
9. Cf. Algazel, *Metaphysics* (Muckle), pp. 119-171.
10. Cf. Averroes, *Commentarium medium in Aristotelis De generatione et corruptione libros* (Fobes e.a.), p. XI; Averroes, *on Aristotle's De generatione et corruptione* (Kurland), p. XIII.
11. Cf. Averroes, *on Aristotle's De generatione et corruptione* (Kurland).

(Urbinate, 186). Il date de l'époque humanistique; copié au XVe siècle, il a appartenu à Frédéric de Montefeltro, duc d'Urbino (†1480). De 1480 à nos jours, pas d'édition, pas d'insertion dans l'édition de Venise (1508), parmi les *Opera philosophica* d'Avicenne; c'est donc le silence presque total de 1480 à 1987, date de l'édition critique dans la collection "Avicenna Latinus."[12]

Silence et disparition *presque* totales, disons-nous. En effet, le traité *De generatione et corruptione* d'Avicenne présente l'une des dernières formulations issues de la représentation d'un univers qualitatif. Les discussions que cette représentation suscite aux XIVe et XVe siècles ont contribué, par contraste, à la première ébauche et au progrès ultérieur d'une physique quantitative. Un sujet de discussion en particulier devient un topique parmi les naturalistes,[13] c'est de déterminer le statut des corps mixtes. Comment les corps mixtes se forment-ils à partir des éléments? Les éléments et leur forme substantielle respective sont-ils conservés ou non dans les mixtes? Comment, sous la dépendance des qualités premières, se forment les qualités sensibles (odeurs, saveurs, couleurs)? Quel rapport faut-il établir entre ces qualités sensibles et le "tempérament" ou la "complexion"?

A l'arrière-plan de ces discussions, on se réfère soit à la métaphysique d'Aristote, selon laquelle les corps mixtes sont composés de matière et de forme, soit à sa philosophie de la nature, selon laquelle les corps mixtes sont composés des quatre éléments.[14]

Comme recours à des *auctoritates*, l'opinion d'Avicenne et l'opinion adverse d'Averroès sont régulièrement citées. Lecteurs passionnés du *Canon de médecine* d'Avicenne, des médecins prennent part au débat, tel Hugues de Sienne ou Ugo Benzi (†1439). Celui-ci commente la première partie du *Canon*[15] et passe en revue les thèses relatives au "mode de génération des mixtes à partir des éléments et à la permanence des éléments dans le corps mixte." Est directement mise en cause, dans les diverses thèses formulées à propos des corps mixtes, la notion de complexion, dont, après d'autres médecins, Avicenne traite dans le *Canon*, mais aussi dans ses écrits philosophiques.[16] Ainsi, dans le *Liber quartus naturalium*, Avicenne précise que le corps composé est disposé par sa complexion (celle-ci étant le mélange des qualités premières particulier à chaque corps mixte) à recevoir du Donateur des formes une forme ou puissance

12. Cf. Avicenna, *Liber tertius naturalium* (Van Riet), p. 66*.
13. Cf. d'Alverny, "Survivance et renaissance," p. 86.
14. Maier, *An der Grenze*, pp. 3-4: "Die Lehre von den Elementen und das Problem: utrum maneant in mixto?"
15. Cf. Ugo Senensis, *Expositio U.S. super primo Canonis Avicenne* (Venezia, 1498).
16. Maier, *An der Grenze*, p. 27: "Die Avicenna'sche Lehre von der complexio hat im medizinischen Schrifttum eine ungeheure Rolle gespielt und ist zu einem der wichtigsten Begriffe in der mittelalterlichen Medizin geworden."

propre.[17] Qu'en est-il donc, dans chaque thèse, des qualités premières, formes substantielles des éléments?

Hugues de Sienne cite quatre thèses. D'après la première, les mixtes ne peuvent, en aucune manière, résulter des éléments; il n'y a dans les mixtes ni formes substantielles ni formes accidentelles élémentaires. Hugues la condamne comme étant insensée (*dementia*). La deuxième est énoncée, dit Hugues, d'après le *De generatione et corruptione* d'Avicenne ("et dicit Avicenna in libro De generatione et corruptione"), à savoir que cette thèse est une opinion venue du dehors ("quod ista est extranea opinio"), prônée par certains de ses contemporains ("quam quidam moverunt circa sua tempora"). Et Hugues continue: "Sic enim dicit ⟨Avicenna⟩ ad litteram: quidam moverunt quandam opinionem extraneam et mirabilem circa ista tempora, dicentes quod simplicia, quando commiscentur et in se invicem operantur, deveniunt ad denudationem suarum formarum et nullum eorum tenet propriam formam." Ici prend fin la citation littérale empruntée au traité avicennien:[18] à la suite d'Avicenne, Hugues la rejette car elle implique qu'il n'y a dans le corps mixte aucune permanence des formes substantielles élémentaires. La thèse d'Avicenne est citée en quatrième lieu; Hugues la résume en disant que, pour Avicenne, les éléments ne sont pas brisés (*refracta*) dans leurs formes substantielles; ces formes ne peuvent varier en intensité, *minus et magis*; mais les éléments peuvent être diminués (*remissa*) dans leurs formes accidentelles et sont joints les uns aux autres par une forme surajoutée (*per formam superadditam*).[19] Et Hugues conclut plus loin: "Adhaereo quartae positioni quae est Avicennae." Cette adhésion à la thèse d'Avicenne, Hugues la

17. Cf. Avicenna, *Liber quartus naturalium* (Van Riet), pp. 79$^{78-86}$; Maier, *An der Grenze*, pp. 23-24, résume bien la doctrine avicennienne: "Avicenna hat das Aristoteleswort von dem Erhaltenbleiben der dynamis oder potentia so ausgelegt, dass die formae essentiales oder formae substantiales im mixtum unverändert bewahrt bleiben, und nur ihre Qualitäten eine *remissio*, d.h. eine Verminderung in intensiver Beziehung, erfahren, wodurch die erforderliche Veränderung, die in dem Satz 'mixtio est miscibilium alteratorum unio' gefordert wird, gewährleistet ist. Diese *qualitates remissae* oder *fractae* oder *castigatae* verschmelzen zu einer sogenannten complexio, einer mittleren Qualität, mit der die Grundqualität des mixtum gegeben ist. Doch liegt der Fall nicht so, dass die Qualitäten der Elemente und die aus ihnen entstehende complexio die neue substantiale Form des mixtum hervorbringen, sie bereiten sie nur vor und schaffen die nötige Disposition zu ihrer Aufnahme in der Materie. In diese so disponierte Materie führt der *dator formae* — Gott — unmittelbar die neue Form ein (die natürlich zu den erhalten gebliebenen substantialen Formen der vier Elemente hinzutritt) und mit der neuen substantialen Form zugleich die sämtlichen mit ihr gegebenen und aus ihr folgenden Akzidentien. Zu diesen gehört aber auch und in erster Linie die complexio, die doch nichts anders ist als die Verschmelzung der qualitates remissae der vier Elemente."

18. Cf. Ugo Senensis, *Expositio U.S. super primo Canonis Avicenne* (Venezia, 1498), fol. 5$^{v}$; voir Avicenna, *Liber tertius naturalium* (Van Riet), VII, p. 70$^{1-7}$, et d'Alverny, "Survivance et renaissance," p. 86.

19. Ugo Senensis, *Expositio U.S. super primo Canonis Avicenne* (Venezia, 1498), fol. 6$^{ra}$: "Quarta positio est Avicennae et est quod elementa sunt divisa ad minima et remissa in suis formis accidentalibus et sunt coniuncta cum aliis per formam superadditam. Et haec tamen habent formas substantiales non refractas, tamen non recipiunt magis et minus."

justifie principalement parce que, dit-il, "le mixte ne serait vraiment un mixte un qu'à la condition que, par l'altération des miscibles, soient acquises une complexion une et enfin une forme substantielle une, conférant aux éléments unité et continuité. On ne dit donc pas qu'un mixte est vraiment un seulement par agrégation, mais par l'unité d'une forme surajoutée."[20]

Mais, tout en commentant le *Canon* d'Avicenne et en préférant à d'autres doctrines la doctrine avicennienne des éléments et des qualités premières issue du *De generatione et corruptione* et des traités annexes, Hugues de Sienne confirme aussi l'intérêt que peuvent avoir, avant 1280, les traités d'Averroès pour la connaissance des doctrines parallèles d'Avicenne. En effet, avant d'énoncer la position d'Avicenne, Hugues énonce, en troisième place, la thèse adverse d'Averroès, non pas en l'isolant de son contexte, mais en indiquant la référence précise où chacun peut la trouver, à savoir, dans le Grand commentaire du *De Caelo* III, 67: "Tertia positio commentatoris Averrois, ... tertio de Caelo, commento 67°. Et est quod elementa remanent in mixto potentia et non actu." D'après ce dernier texte, ce sont les formes substantielles mêmes qui, pour Averroès, sont *remissae* ou *diminutae*; Averroès affirme donc que les quatre éléments sont mêlés quant à leur substance ("nam ideo ponit eas remitti ut secundum substantiam misceantur"), ce que, dit Averroès, Avicenne ne peut accepter ("quod dicit Avicennam non posse dicere cum dicat elementa remanere in formis suis substantialibus non refracta"). Ce disant, Hugues interprète correctement un des passages pouvant se lire à la référence qu'il donne du commentaire d'Averroès sur le *De Caelo* d'Aristote: "Si igitur aliquis dixerit quod sequitur ex hoc ut formae eorum substantiales recipiant magis et minus, et haec est dispositio accidentium, non formarum substantialium: dictum est enim in multis locis quod formae substantiales non recipiunt magis et minus. Dicemus quod formae istorum elementorum substantiales sunt diminutae a formis substantialibus perfectis et quasi suum esse est medium inter formas et accidentia. Et ideo non fuit impossibile ut formae eorum substantiales admiscerentur et proveniret ex collectione earum alia forma, sicut, cum albedo et nigredo admiscerentur, fiunt ex eis multi colores medii. Et, cum hoc latuit Avicennam et concessit quod formae substantiales non dividuntur in magis et minus, dicit quod haec elementa non miscentur nisi secundum qualitates eorum, non secundum substantias."[21]

20. *Ibid.*, fol. 6$^{va}$: " ... nec mixtum esset vere mixtum unum nisi per alterationem miscibilium acquireretur una complexio et tandem una forma substantialis quae facit uniri vere elementa et continuari. Non igitur dicitur mixtum vere unum solum per aggregationem sed per unitatem formae superadditae."

21. Averroes, *In quattuor libros De caelo Aristotelis paraphrasis* (Venezia, 1562 – 1574), fol. 227$^{ra}$ C. Averroès attribue à l'incompétence d'Avicenne et à la fatuité de sa confiance en sa propre valeur les erreurs qu'il dénonce, voir *ibidem*, fol. 227$^{ra}$ F.

## V

La discussion qui vient d'être évoquée entre Avicenne et Averroès sur la question de la permanence des éléments dans le corps mixte, discussion que le médecin Hugues de Sienne rapporte en détail, peut nous servir d'exemple; elle indique une manière de retrouver la trace du *De generatione et corruptione* d'Avicenne *après* 1280, mais aussi la manière dont les thèses avicenniennes ont pu être connues indirectement, dès l'entrée des textes arabes en Occident latin, *avant* 1280, c'est-à-dire avant même que ce traité n'existe en traduction latine.

Après 1280, il faudrait explorer les textes encore inédits des diverses "quaestiones *De generatione et corruptione*" des XIVe et XVe siècles, et centrer cette exploration autour de problèmes "topiques" des naturalistes et des médecins, malgré leur présentation étroitement scolastique (donc non vivifiée par l'observation du réel et l'expérimentation); c'est là que, en paraphrases ou en citations littérales, on a quelque chance de trouver des traces de l'utilisation du traité avicennien *De generatione et corruptione*. On peut d'ailleurs étendre cette exploration à la controverse sur la pluralité des formes, même si cette controverse est fondamentalement étrangère au débat sur le problème de la permanence des éléments dans le corps mixte.[22]

Avant 1280, identifier par quelle voie ont été connus des matériaux avicenniens appartenant au *De generatione et corruptione* et aux traités connexes relève de l'alternative suivante:

- ou l'on suppose qu'il y eut, fût-ce partiellement, une traduction latine antérieure à 1280; mais d'une telle traduction on ne possède aucune trace;
- ou l'on s'en tient à ce qui ressort de l'histoire de la traduction latine, c'est-à-dire que le *De generatione et corruptione* d'Avicenne précédé du *De caelo* et suivi du *De actionibus et passionibus* ne fut traduit en latin que vers 1280 et que, dès lors, les doctrines imputées à Avicenne avant 1280 doivent avoir été connues par des intermédiaires.

Dans la plupart des cas, tel le problème de la permanence des éléments dans les corps mixtes, le *De Caelo* d'Averroès ou le *Canon de médecine* d'Avicenne peuvent être considérés comme les sources médiates des doctrines avicenniennes citées. Albert le Grand, dans son *De Caelo et Mundo*, écrit: "Si aliquis objiciat dicens, quod formae substantiales non diminuuntur et remittuntur, eo quod sint simplices, respondet Averroes dicens quod formae substantiales elementorum

22. Maier, *An der Grenze*, p. 27: "Diese Schwierigkeiten haben nichts zu tun mit der Kontroverse über die Pluralität der substantialen Formen, und sind für alle scholastischen Denker dieselben, ob sie nun annehmen, dass jedes compositum nur e i n e substantiale Form, die forma mixti, hat — die dann ihrerseits sehr verschiedene Gestalt annehmen kann, von der forma substantialis eines leblosen Körpers bis zur anima rationalis — oder ob sie in den höheren composita mehrere einander irgendwie unter- oder nebengeordnete substantiale Formen sehen."

non completae sunt sicut formae substantiarum perfectarum: et ideo possunt intendi et remitti: quia sunt mediae inter formas substantiales et accidentia: et ista in suis libris tradunt Avicenna et Averroes, licet Averroes contradicere videatur Avicennae."[23] Plusieurs textes de Thomas d'Aquin énoncent, de même, le contenu de la doctrine avicennienne sur la permanence des formes substantielles élémentaires dans le mixte comme celui d'une doctrine notoirement connue.[24]

Des signes extérieurs permettent de déceler l'existence de ces sources médiates; par exemple chez Albert le Grand, la présence du nom d'Avicenne accompagné de celui qui peut renvoyer à la source médiate: ainsi, *sermones Galeni et Avicennae* peut renvoyer au *Canon de médecine, Avicenna et abbreviator eius Algazel* peut renvoyer à la traduction latine d'Algazel par Gundissalinus.[25]

Parmi les thèmes du *De generatione et corruptione* d'Avicenne qui, traités aux XIVe et XVe siècles sans mention explicite d'auteur, portent cependant la marque de leur origine avicennienne, deux sont particulièrement significatifs et mériteraient une étude parallèle à celle qui est esquissée ici pour le thème de la permanence des éléments dans le corps mixte: le thème du *dator formarum*, Intellect agent séparé, donateur non seulement des formes intelligibles, mais de toutes les formes substantielles du monde physique sublunaire,[26] et celui de l'"occultation des formes," évoquant la thèse des théologiens musulmans pour qui la création du monde est totalement achevée dès l'origine; en ce monde, il y a "latence" de tous les dynamismes qui, déjà présents en chaque corps, ne se "manifesteront" que progressivement dans le temps.[27]

En bref, les données historiques certaines concernant la transmission du *De generatione et corruptione* d'Avicenne à l'Occident médiéval imposent, comme date initiale de cette transmission, l'année 1280. Des matériaux de ce traité avicennien et des traités connexes peuvent avoir été connus par voie médiate avant 1280. Après 1280, la trace du *De generatione et corruptione* d'Avicenne apparaît à propos de problèmes posés par la scolastique aux XIVe et XVe siècles, surtout si ces problèmes intéressent les médecins et trouvent un point d'ancrage dans le *Canon de médecine* d'Avicenne.

Pourtant, l'histoire de ce traité, la quête de ses traces, pour la période d'après 1280, n'a pas encore été entreprise; le manuscrit de la Bibliothèque Vaticane, support de l'édition du *De generatione et corruptione* d'Avicenne dans la collection "Avicenna Latinus," en est encore aujourd'hui le seul témoin inventorié.

23. Albertus Magnus, *De caelo et mundo* (Borgnet), III, 2, 2, p. 258.
24. Voir les textes de Thomas d'Aquin cités par Zavalloni, *Richard de Mediavilla*, pp. 427-428, note 29.
25. Cf. Albertus Magnus, *De generatione et corruptione* (Borgnet), I, 6, 6, p. 411 et p. 414.
26. Cf. Verbeke, "Un univers qualitatif," pp. 23*-25*, voir ci-dessus note 17.
27. Cf. Verbeke, "Le problème du devenir," pp. 35*-44*; voir ci-dessus, note 7.

# Burgundio of Pisa. Translator of the Greco-Latin Version of Aristotle's *De generatione et corruptione, translatio vetus*

*James K. Otte*

This paper chronicles the search for the translator of Aristotle's *De generatione et corruptione*. Only two years ago was he positively identified as Burgundio of Pisa (c. 1110 – 1193). My account will summarize the investigation that lasted more than six decades, and it will demonstrate how the scholarly judgments of preceding scholars laid the foundation for the eventual discovery. As this paper will show, identification of the elusive translator was not only difficult, but also very much a collective endeavor.

In the twelfth century there existed two Latin versions of the *De generatione et corruptione*, one translated from Greek, the other from Arabic. The version from the Greek with the incipit: "De generatione et corruptione ... " is anonymous and, being the older of the two, was known as the *Translatio vetus*. But even the translation from Arabic with the incipit: "Oportet nos determinare ... ," translated by Gerard of Cremona, originated before 1187, the year of Gerard's death.[1] The difficulty lay with the Greco-Latin translation, especially with the identity of its translator. An unidentified translation might have initiated a search for his identity. But the situation was confounded by the attribution of the translation to the wrong person, which initially seemed to make further investigation unnecessary.

## The first Deception: Henry Aristippus

The oldest translation of the *De generatione et corruptione* was at one time attributed to Henry Aristippus. In his contribution to Martin Grabmann's *Festschrift* in 1935, George Lacombe cited a marginal note in a Greco-Latin version of the *De generatione et corruptione* in an unmarked codex of Aristotelian manuscripts at the John Walters Library in Baltimore which states, "Liber

1. Grabmann, *Forschungen*, p. 177, gives the Arabic-Latin and Greek-Latin incipits of the *De generatione et corruptione* which in MS Wien, Österreichische Nationalbibliothek, Cod. lat. 2318 appear in parallel columns, on the left the Arabic: "Oportet nos determinare ... " and on the right the Greek: "*De generatione et corruptione* ... " The Arabic-Latin version is by Gerard of Cremona.

Aristotelis translatus ab Henrico Aristippo de greco in latinum."[2] Unfortunately, that same note also found its way into the *Aristoteles Latinus* in 1939.[3] But Henry's recognition proved ephemeral.

In a 1947 article Lorenzo Minio-Paluello examined the Greco-Latin *De generatione et corruptione* manuscript at the Bodleian Library [Selden supra, 24, fols. 41$^{r}$-63$^{v}$].[4] He dated its hand to the end of the twelfth century and concluded that it contained the oldest translation of the *De generatione et corruptione*. He found it to be a literal translation from Greek into Latin and quite contrary to the style of Henry Aristippus. In his analysis Minio-Paluello demonstrated that as a rule Henry Aristippus "uses an extraordinary variety of Latin words to translate the same Greek word."[5] Further, "the similarities in vocabulary, and in grammatical construction, and the transformation of Greek syntax, characteristics ... shared by Henry Aristippus' translation of the *Phaedo*, the *Meno*, and book IV of the *Metheora*, confirm that he was the translator of these works."[6] But in contrast, "the reciprocal univocity between the Greek and Latin in the translation of the *De generatione et corruptione* suffices to reject the attribution of the translation to Henry Aristippus,"[7] so that the attribution to Henry of the Baltimore manuscript was wrong. Minio-Paluello determined that the text in the Oxford manuscript represents the oldest Latin translation of the *De generatione et corruptione*, but once again it had to be classified as anonymous.

In a subsequent article of 1952, Minio-Paluello assigned both a likely place of origin and an earlier date of origin to the translation of the *De generatione et corruptione*.[8] Again applying the same philological comparisons which had disqualified Henry Aristippus, Minio-Paluello now concluded that its anonymous translator was the same scholar who had translated the *Nicomachean Ethics* into Latin.[9] In time, Minio-Paluello's conclusion proved constructive; his judgment would be vindicated. But some thirty years would pass before the question of the translator's identity was once again taken up.

2. Lacombe, "Alfredus in Metheora," p. 464. "Liber Aristotelis translatus ab Henrico Aristippo de greco in latinum, correctus et per capitula distinctus a magistro Alvredo de Sares⟨hel⟩, secundum commentum Alkindi super eundem librum."
3. Lacombe, *Aristoteles Latinus*, pp. 237-238.
4. Minio-Paluello, "Henri Aristippe."
5. *Ibid.*, p. 213. All translations are mine.
6. *Ibid.*, p. 219.
7. *Ibid.*, p. 222.
8. Minio-Paluello, "Iacobus Veneticus Grecus."
9. *Ibid.*, p. 279, n. 28, Minio-Paluello promised to "show somewhere else that all these [i.e., *Ethica vetus, Ethica nova, Ethica Borghesiana*] are parts of one (complete?) translation of the *Nicomachean Ethics* made in the twelfth century by the same scholar who translated the *De generatione et corruptione*."

## The Second Deception: The Wrong Date

A potential break-through ensued in 1983 when Nigel G. Wilson described how more than two hundred years ago, "A. M. Bandini in his catalogue of the Laurentian Library noted the occurrence of Ioannikios' hand in a number of manuscripts."[10] But Bandini did neither comment on the script, nor did he "mention the even more striking hand" of a second scribe who accompanies Ioannikios "in almost all these volumes." Wilson points out that almost all scholars since Bandini have ignored the second scribe and the scriptorium to which seventeen different manuscripts can be attributed. In Wilson's words, "No other scriptorium active during the middle Byzantine period produced a larger number of surviving books." All this is even more remarkable as a large portion of the manuscripts is important and "in some cases the most important witness for the tradition of the texts that they contain."[11]

In this collection of manuscripts, five volumes contain Aristotelian works. Of these MS Firenze, Biblioteca Medicea Laurenziana, 87.7 represents the second volume and contains the following treatises: *Physics, De caelo, De generatione et corruptione*, and *Meteorologica*. Wilson found the generally accepted date (fourteenth century) of the manuscripts "wrong by an unsatisfactory wide margin of two centuries."[12] Wilson was not alone with this view. As he himself pointed out, H. H. Joachim, the editor of Aristotle's *On Coming-to-be and Passing-away*, had declared *Laur.* 87.7 to be "a twelfth century manuscript of considerable value." C. Mugler in his 1966 edition also reached the same conclusion, observing that, just like in the other volumes, Ioannikios wrote the text and an anonymous colleague wrote the marginal notes.[13] In his discussion of the paleography, Wilson observed that Ioannikios' script appears "extraordinarily untidy and variable." Wilson, according to his testimony, reacted with "disbelief" upon hearing that this hand "was normally assigned to the fourteenth century." For him, it was clear that "the most likely date for Ioannikios is the last third or quarter of the twelfth century."[14] As for the "anonymous colleague," Wilson wrote:

> If the handwriting of Ioannikios is strange, that of his anonymous partner is bizarre in the extreme ... It is the hand of a man who was brought up to write in Latin. His practices as a scribe reveal his origin. He writes catch-words at the end of each quire, a habit which he passed on to Ioannikios, and he sometimes numbers the quires with Latin letters or Roman numerals.[15]

10. Wilson, "A Mysterious Byzantine Sciptorium," p. 161.
11. *Ibid.*, p. 161.
12. *Ibid.*, p. 162.
13. *Ibid.*, p. 164-165.
14. *Ibid.*, pp. 167-168.
15. *Ibid.*, p. 169.

This evidence implies that the two were contemporaries:

> Even if the scribe is not responsible for these notes, they provide the second of the proofs already alluded to, since they are written in a hand of the Caroline type, falling within a tradition that lasted to the end of the twelfth century. The notes therefore provide a *terminus ante quem* unless they were written by an eccentric archaist.[16]

If the "Caroline" script is not an anachronism and its author belonged to the century, who was he then?

Of the likely authors, Wilson actually chose Burgundio of Pisa. He compared the letters *a, d,* and *g* of the anonymous hand of Ioannikios' colleague in the Florence MSS with Burgundio's known signatures. They exhibit such great similarity in form and distinctiveness that "all the Latin paleographers to whom [Wilson showed] the evidence [were] impressed by it."[17] Rhetorically Wilson then asks, "But if the twelfth century were a possible date, why not test the hypothesis that we actually possess the manuscript used by Burgundio? After listing additional direct and indirect evidence for Burgundio's identity as Ioannikios' "anonymous colleague," Wilson nonetheless concluded,

> It is very hard to believe that [Burgundio] is Ioannikios' partner in the production of the manuscripts because of the wide interests Ioannikios evidently had outside the fields of medicine and philosophy. So I am inclined to think that we are dealing with two hands. Apart from Burgundio we have a scribe of Latin upbringing.[18]

Wilson had, in fact, correctly dated the hand of the "anonymous colleague" as twelfth century, and some of his evidence had suggested the hand of Burgundio of Pisa. As we will see below, the question of a second hand is still open.[19] Unfortunately, however, few scholars paid much attention to Wilson's important and pioneering study, and *Laur.* 87.7 continued to be viewed as a fourteenth century manuscript.

This late dating had particular consequences for Joanna Judycka, as she edited the *De generatione et corruptione* (*Translatio vetus*).[20] In the introduction of her edition, Judycka observed that "Of all the Greek evidence known and utilized in the contemporary editions, it is manuscript Florence Bibl. Laur. 87.7 (F) of the fourteenth century [!] that represents the text closest to the *Translatio vetus*.[21] Although, in a footnote, she mentioned that H. H. Joachim had assigned that same manuscript to the twelfth century,[22] she did not pursue Wilson's theory that Burgundio might have been the author of the Greek and Latin marginalia. But she recognized the skill of the translator:

16. *Ibid.*, p. 169.
17. *Ibid.*, p. 171.
18. *Ibid.*, p. 172.
19. *Ibid.*, p. 14, n. 6.
20. Aristoteles, *De generatione et corruptione* (Judycka).
21. *Ibid.*, pp. LV-LVI.
22. *Ibid.*, p. LVI.

> The translator knew his trade: he did not commit the errors resulting from faulty readings of terms, of an itacisme or of an erroneous interpretation of accents or of the meanings. He transcribed well the proper names and hardly ever used the copula.[23]

In her analysis of the translation, Judycka listed a number of the most common grammatical and lexical examples and characteristics of the translator. She indicated that the translator in an early citation from Empedocles retained the text in Greek and that many Greek terms are simply transcriptions rather than translations from the Greek text, e.g., *panspermiam, autotrigonum.*[24] That is equally true of ἄτομος, which the translator at times rendered as *atomus* and then also as *indivisibilis*. In the words of Dr. Judycka, "The translator ... searched laboriously for the [Latin] term capable of rendering also as adequately as possible the meaning of the Greek word."[25] Such double translations were also retained in subsequent Latin copies, e.g., in the MSS Oxford, Bodleian Library, Selden supra, 24 and Avranches, Bibliothèque municipale, 232. Since Judycka had accepted the fourteenth century as the date of the composition of *Laur.* 87.7, there was little reason for her to speculate about the translator's identity in this manuscript. After all, the two oldest existing Latin manuscripts, Oxford and Avranches, presumably antedated the Florence MS by no less then two centuries.

So, when Judycka published her edition in 1986, the Greco-Latin version was still considered anonymous, a status conferred upon it by Minio-Paluello in 1952. What made matters worse, in some of Galen's works, as annotated by Burgundio, the Latin translation is attributed to Niccolò da Reggio (*fl.* 1308 – 1345).[26] This led Judycka into a further deception: if Niccolò was the Latin translator, there could be no question that Laurenziana 87.7 was of the fourteenth century. The oldest known Latin manuscripts of the *De generatione et corruptione* remained thus Oxford and Avranches, and consequently, divergences in the Florentine MS had to be explained as variants.[27]

But if the Florence MS had misled Dr. Judycka concerning the date of composition, she nonetheless provided a major clue in the search for the translator. In her comparison of the method employed by the translator, Judycka found confirmation of Minio-Paluello's thesis which had attributed the translation of the *De generatione et corruptione*, the *Ethica nova* and the *Ethica vetus* to the same author.[28] If valid, this thesis could be helpful in revealing the identity of the translator for all three treatises.

23. *Ibid.*, p. XXXI.
24. *Ibid.*, pp. XXXI-XXXIII.
25. *Ibid.*, p. XXXIII.
26. Vuillemin-Diem, "Burgundio de Pise," p. 138.
27. *Ibid.*, pp. 140-148.
28. Aristoteles, *De generatione et corruptione* (Judycka), p. XXXVIII.

In 1988 Nigel Wilson revisited his earlier thesis by turning once again to MS Firenze, Biblioteca Medicea Laurenziana, 87.7 and specifically to the text of the *De generatione et corruptione*. With Judycka's edition before him, Wilson concluded:

> The variants of [Judycka's] Latin version are almost unbelievably close to those of the Laurentianus. In the Greek, for each page in the Bekker edition, there are on average about sixteen distinctive variants, and the author of the version adopts about fourteen per page, the total number of coincidences being about 700. This is almost too good to be true, and there must be a high probability that it was precisely this codex which the translator owned and used.[29]

If substantiated, Wilson's judgment would provide a double benefit: it would remove Niccolò of Reggio as the translator of *Laur.* 87.7 and restore the manuscript to the twelfth century. While additional paleographic evidence had confirmed Wilson's 1983 thesis, the philologist, Richard J. Durling, now provided additional philological documentation. Alerted by a detail, a peculiarity of the translator that Judycka had noted, Durling turned to a philological examination of the same manuscript.

Judycka had noticed that the translator of the *De generatione et corruptione* in *Laur.* 87.7 had rendered the Greek term *οἷον* into the Latin *verbi gratia* some 53 times which, to her knowledge, no other medieval translator had done. Durling writes, "Alerted by this [i.e., *verbi gratia* for *οἷον*], I remembered that this equivalent is found twice in Burgundio of Pisa's rendering of Galen's influential *De complexionibus*." His list of particles comparing Burgundio's translations of Galen's *De complexionibus* and *De interioribus* with the anonymous Florence manuscript of the *De generatione et corruptione* reveals the similarity in language of the translator. Durling concluded, "I am now convinced that the *Translatio Vetus* is the work of the learned judge, translator, and ambassador, Burgundio of Pisa."[30] But Durling, who did not want to hide the existing counter-evidence, prefaced some five pages of the translator's vocabulary, which is far less conclusive than the list of particles with the caution: "Too many nouns, adjectives, verbs and adverbs occur too seldom to permit any valid conclusions."[31] After all, the limitations inherent in an analysis based on a translator's *Sprachgebrauch* had been strongly indicated by the editors of Aristotle's *Physica*, Fernand Bossier and Jozef Brams: "le nombre des équivalents possibles d'un vocable grec déterminé est assez restreint."[32]

A paper by Fernand Bossier, presented at Rome in June 1996 and published in 1997,[33] builds on the foundation laid by Wilson and Durling. The author there examines and compares the characteristics of Burgundio's various translations

29. Wilson, "Ioannikios and Burgundio," p. 451.
30. Durling, *The Anonymous translation*, p. 320.
31. *Ibid.*, p. 324.
32. Aristoteles, *Physica* (Bossier e.a.), p. XLVI, as cited by Durling, p. 325.
33. Bossier, "L'Élaboration du vocabulaire."

from Greek into Latin. He demonstrates with numerous examples how Burgundio used an abundance of notes to accomplish his translations. Following the work of Durling, he too examines Burgundio's terminology and his translation of certain technical terms and points out that already in 1974, Peter Classen has established the correct chronology of Burgundio's translations.[34] This is followed by an examination of Latin choices and their frequency of Latin words Burgundio made in translating the Greek terms of his texts. In his final section, "the elaboration of the philosophical terminology," Bossier investigates the adequacy of Burgundio's Latin terminology. He closes his investigation with some typical examples: substantives, adjectives, adverbs, drawn from "the wealth of Greek philosophical terminology, which compelled Burgundio to utilize, indeed to create, a terminology which exploits to the maximum the possibilities of the Latin language."[35] Bossier's enormous scholarly contribution is aptly described by Gudrun Vuillemin-Diem and Marwan Rashed:

> [Professor Bossier] confirmed, consolidated and enlarged Durling's conclusions in a most extensive study, which supports the philosophical vocabulary, the methodological development, and the chronology of the translations of Burgundio. It sets in evidence the authorship [*paternité*] of Burgundio not only for the *De generatione et corruptione*, but also for the old translation of the *Nicomachean Ethics – Ethica Vetus* (books II and III), *Nova* (book I), *Hoferiana*, Borghesiana (fragments of books II-X) — equally considered anonymous until now.[36]

Both scholars have incorporated and built upon Bossier's study in their own examination of Burgundio of Pisa's Greek manuscripts (*Laur.* 87.7 and *Laur.* 81.18). In their study the authors propose:

> ... to establish here the ties between Burgundio of Pisa (c. 1110 – 1193) and two Aristotelian MSS which were inserted in a collection of other works, as much paleographic as philological, which, after some fifteen years, have enriched our knowledge of this great translator. We propose then to show at first the results of this research, which we will present only as a supplement of information.[37]

Benefitting from the studies of Wilson, Durling, and Bossier, Vuillemin-Diem and Rashed now turned to *Laur.* 81.18 and *Laur.* 87.7 with two questions — one paleographic, the other philological: are the Latin notes in the manuscript of Aristotle as copied by Ioannikios, themselves from the hand of Burgundio like the Latin notes in the works of Galen? Is the particular text of the *De generatione et corruptione* contained in the manuscript of Aristotle even if the Greek copy [version] of the translation of Burgundio does not include the Latin notes? By the same token, *Laur.* 81.18, the second Aristotelian volume copied by Ioannikios and containing likewise a work translated by Burgundio, provokes two questions of the same type: was this MS the Greek source of the translation

34. Classen, *Burgundio von Pisa.*
35. *Ibid.*, p. 113.
36. Cited in Vuillemin-Diem e.a., "Burgundio de Pise," p. 139.
37. *Ibid.*, p. 136.

of Burgundio's *Nicomachean Ethics*, and does it possibly also include some traces of the translator?[38]

With their parameters established and their questions formulated, the two authors embarked on an examplary philological and paleographic examination of the Florentine manuscripts. Their lengthy and exhaustive examination of codices *Laur.* 87.7 and *Laur.* 81.18 provides all the evidence which Wilson had at first speculatively, then ever more convincingly, presented since 1983 and which they rightly call "conclusions of great importance."[39] Building on Wilson's discussion of Burgundio, the authors close with the observation: "The relationship of Burgundio with the manuscripts of Galen, copied by Ioannikios and his collaborator, is thus established."[40] Their answers are conclusive and convincing. To follow all of their intricate analyses of this veritable detective story is well beyond the scope of this paper, and I will close by offering the conclusions G. Vuillemin and M. Rashed themselves provide.[41]

1. It is philologically certain that *Laur.* 87.7 is the only example of the translation of the *De generatione et corruptione* by Burgundio of Pisa.
2. It is philologically certain that *Laur.* 87.7 is the only example of the translation of the *Nicomachean Ethics* by Burgundio of Pisa.
3. It is paleographically certain that all the marginal Latin notes of *Laur.* 87.7 (hand D) are Burgundio's.
4. It is very probable that the Greek marginal notes (hand C) in *Laur.* 87.7 and consequently those in *Laurentiani* 81.18 and 81.4 are likewise Burgundio's [analogous and complementary with notes C and D; Latino-Greek notes: comparable by expression and ink].
5. It is almost certain [for paleographic reasons] that the form of Latin letters [hand E], which one finds between the lines in all the manuscripts copied by Ioannikios, is the hand of Burgundio.
6. The system of Latin letters (E) is, however, materially and directly tied to the Greek notes of the "anonymous colleague," B. If we accept the attribution of the Latin hand E to Burgundio, it follows either that the "anonymous colleague" is none other than the translator of Pisa, and all the interventions of the former are due to the latter — a risky hypothesis to hold, surprising from an historical point of view, and problematic from a paleographic point of view (two different Greek writings by Burgundio?) — or that the "anonymous colleague" and Burgundio worked together on a great number of Aristotle's works and on some others by Galen. In the present state of our knowledge we can neither affirm nor disclaim one or the other of the two hypotheses.

Our history ends here. The identity of the translator is revealed: he is the twelfth century judge, translator, and ambassador, Burgundio of Pisa. The unveiling of his identity had taken some six decades and was truly a collective effort: scholars benefitting from the work of their predecessors and with each generation contributing to our knowledge of the prominent twelfth century scholar, Burgundio of Pisa.

**38.** *Ibid.*, p. 139
**39.** *Ibid.*, p. 137.
**40.** *Ibid.*, p. 140.
**41.** *Ibid.*, pp. 179-180.

# Aristotle on Democritus's Argument Against Infinite Divisibility in *De generatione et corruptione*, Book I, Chapter 2

*John E. Murdoch*

In Book 1, chapter 2, of *On Generation and Corruption*, Aristotle first presents and then criticizes arguments purported to be those of Democritus in support of his atomist position. What I should like to do here is to uncover at least some of the *fortuna* suffered by those arguments in the Latin Middle Ages and, to a much lesser extent, in the Renaissance.

In the course of his exposition of Democritus's argument, Aristotle pauses to note the puzzle, the *aporia*, which is at the bottom of it all: "Since, therefore, it is impossible for magnitudes to consist of contacts or points, there must be indivisible bodies and magnitudes. Yet, if we *do* postulate the latter, we are confronted with equally impossible consequences [316b14-17]."[1] In typically Aristotelian fashion, he worries his way through the *aporia*, reconsidering each element of the argument from a different point of view and even, at the mid-point of his exposition, claiming that it would be well to reformulate the whole problem over again from the beginning (316b18-19).

Aristotle precedes his presentation of the argument by a kind of proem in which he contrasts the views and methods of Democritus with those of Plato. For while the latter, he claims, urged the existence of indivisible magnitudes on grounds of a dialectical (λογικῶς) method of inquiry, the former preceded φυσικῶς and hence by arguments more appropriate, Aristotle felt, to the subject at hand. This was frequently seen by medieval and Renaissance scholars to put Plato on the side of the *mathematici*,[2] a distinctly erroneous way of going about an inquiry in natural philosophy (and they had the *Timaeus* to back them up).

1. The translation (here and in what follows unless otherwise noted) is that of H. H. Joachim appearing in the so-called *Oxford Aristotle*. Incidentally, Aristotle indicates that these "impossible consequences" have been examined in some of his other works, a reference chiefly, if not solely, to Book VI of the *Physics*.
2. For example: Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 122$^{r}$, and MS Paris, Bibliothèque Nationale, lat. 14714, fol. 124$^{v}$: "Quia videbatur magis rationabile corpora ultima resolvi in puncta, quia Platonici et mathematici hoc dicere videbantur"; Didacus de Astudillo, *Quaestiones super II libros De generatione* (Valladolid, 1532): "Plato ... non reddit rationem nisi mathematicam vel logicam, Democritus

## The Argument

But to turn to the argument itself.[3] If one supposes that a body, that is, a magnitude, is *divisible* through and through (πάντῃ διαιρετόν) and that such a division is possible, what will there be in the body which escapes this division? Even more strongly put, if the body is *divided* through and through (πάντῃ διῃρημένον), since such a division involves no impossibility as well, what will be left? One cannot answer that there will be a magnitude left over, because this would run counter to the express supposition that the body was divisible through and through. The only alternative is to maintain that, given such a division, a body would consist of points or of mere nothings, neither of which, for one reason or another, is admissible.

Perhaps one might maintain, Aristotle continues, that a minute portion of the body — like a piece of sawdust (ἔκπρισμα) — becomes detached and evades the division. But even then, the same argument applies, since in what sense is that minute section itself divisible? Similarly, if that which was detached was not a body but a separable form or quality (εἰδός τι χωριστὸν ἢ πάθος) and if the magnitude is "points or contacts thus qualified," once again the resulting situation is clearly inadmissible. Consequently, all told, the only permissible alternative is that there are indivisible bodies and magnitudes, which is, naturally, the result intended by Democritus.

It is at this point that Aristotle claims that it would be well to restate the puzzle from the beginning. On the one hand, he tells us, every perceptible body is *potentially* divisible at any point (καθ' ὁτιοῦν σημεῖον), but, on the other hand, it is *actually* indivisible at any point. But, given this, that potential divisibility might actually occur, the result being that a body would be simultaneously *divided* at any points and that, consequently, composition out of incorporeal somethings or out of points or mere nothings would again ensue. There must be then, once again, uncuttable magnitudes (ἄτομα μεγέθη).

Aristotle concludes his account of Democritus's deliberations by claiming that his opponent's argument conceals a paralogism. Save for the fact that he draws a distinction between a point being anywhere and everywhere (καὶ ὁπῃοῦν καὶ πάντῃ στιγμὴν εἶναι) in a magnitude, we need not follow him here because we have enough to appreciate the medieval and Renaissance understanding of his, and Democritus's, moves.

However, a word might be in order, if only parenthetically, of what modern exegetes have considered Democritus, admittedly à la Aristotle, to have intended in this chapter of the *De generatione*.[4] Of course, the question naturally has arisen as to how much of this argumentation we can actually ascribe to

autem rationibus phisicis omnia persuadet."

3. As a whole, the argument, or better arguments, runs from 315b25 through 317a17.
4. One might look into the modern commentaries on the *De generatione*: Aristotle, *On Coming-to-be & Passing-away* (Joachim); or Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*;

Democritus and how much is rather Aristotle's doing. Recent opinion has been that it does represent an argument actually given by Democritus — note being taken, incidentally, of its resemblance with Zeno's arguments against plurality[5] — but that the "stage directions" are due to Aristotle.[6]

More significantly, ever since Salomon Luria published his article "Die Infinitesimaltheorie der Antiken Atomisten" in 1933, it has been held that the arguments presented in our chapter probably mean that Democritus regarded his atoms as, if not mathematically indivisible (so Luria), at least theoretically indivisible (so David Furley, for instance), as well as being physically indivisible.[7] Yet because the medievals almost always had little concern for what was historically the case — in place of what was true or what made arguments valid and invalid — it should occasion no surprise that they spent almost no effort in pursuit of what Democritus did, or did not, actually hold. One had to await the Renaissance for making historical points about our argument. Thus, in one of the major works on the *De generatione* in the sixteenth century, that of Dominicus Bañez, it is remarked that Democritus did not say that bodies could be through and through divided into mathematically indivisible parts, but into physically indivisible ones, although Aristotle presents him *as if* he has maintained mathematically indivisible parts.[8]

## The General Medieval-Renaissance Reaction

Some general observations of the medieval-Renaissance reaction to our chapter are in order before proceeding to the specifics of the arguments it contains. First and foremost in this regard, due notice must be taken of the fact that Aristotle had treated the infinite divisibility of continua elsewhere, most notably in Book

or, most recently, Aristotle, *De generatione et corruptione* (Williams). On the other hand, there is considerable modern literature which in particular treats the argument in this second chapter of the *De generatione*. Beginning with Jensen, who was the first, it appears, to maintain that Aristotle was referring to an actual argument of Democritus in her "Demokrit und Platon," pp. 92-105, 211-229, she was followed, most notably, by Luria, "Die Infinitesimaltheorie" (especially pp. 129-133) and, equally notable, Furley, *Two Studies*, ch. 6. Other important treatments of the argument here in question are (in chronological order), Mau, *Zum Problem des Infinitesimalen*, pp. 23 ff.; Schramm, *Die Bedeutung der Bewegungslehre*, pp. 245-264; Krämer, *Platonismus*, pp. 261 ff.; Waschkies, *Von Eudoxos zu Aristoteles*, pp. 319-353; Miller, "Aristotle against the Atomists," pp. 87-111; Löbl, *Demokrits Atomphysik*, pp. 75 ff.; Makin, *Indifference Arguments*, pp. 49-62.

5. Furley, *Two Studies*, pp. 84-85 and Luria, "Die Infinitesimaltheorie," p. 107.
6. Furley, *Two Studies*, p. 90. Cf. Cherniss, *Aristotle's Criticism*, p. 113. It is to be noted that in his Commentary on the *De generatione* John Philoponus took them to be Democritus's arguments.
7. See the works cited by Luria and Furley in note 4.
8. Dominicus Bañes, *Commentaria et Quaestiones in duos Aristotelis Stagyritae De generatione et corruptione* (Salamanca, 1585), p. 23: "Nam Democritus non dicebat res dividi in partes omnino indivisibiles mathematice sed physice, ut dicebamus capit. 1. Hic vero arguit contra eum, ac si dixisset dividi rem in partes mathematice indivisibiles; et quod hoc non sit de mente Democriti patet ex concessis ab Aristotele."

VI of the *Physics*. Consequently, medieval scholars often felt it unnecessary to concern themselves with the issue of infinite divisibility in our chapter in the *De generatione*, especially when Aristotle had given more extensive and definitive treatment of it in the *Physics* and where they themselves paid more than due attention to the matter. This ignoring of our chapter is particularly the case when it comes to *Quaestiones* on the *De generatione*.[9] *Expositiones*, on the other hand, where at least some measure must be taken of the letter of the text, are usually better in this regard.

Of course, some references are made to the arguments in the *De generatione* in treatments of the issue of continua and their infinite divisibility in the commentaries on the *Physics*[10] and elsewhere and the same occurs occasionally, without explicit reference, to one or another feature of our arguments, but such occurrences are surprisingly infrequent.[11]

The second general point we should note is one of translation. The so-called *vetus translatio* (taking into account its "double versions") renders the crucial term (πάντῃ) in a multiplicity of ways: *omnino*, *passim*, and *ubique* (once even *undique*).[12] More importantly, the standard medieval interpretation, if not the translation, of this kind of πάντῃ division of a body becomes: *corpus est divisibile*, *esse divisum*, *dividitur*, etc., *secundum unumquodque signum vel punctum*, *secundum quodcumque*, *secundum omne*, *secundum quodlibet*, *signum vel punctum*. These prepositional phrases all were taken to mean the same thing. It is also worthy of note that this same interpretation stands where Aristotle makes a distinction between a point being anywhere (ὁπῃοῦν) or everywhere

9. Thus, although Aegidius Romanus, who played, as we shall see, a major role in the analysis of our argument, has material treating the argument in both his *Expositio* and *Quaestiones* on the *De generatione*, he is something of an exception, since neither Albert of Saxony, Marsilius of Inghen, nor Nicole Oresme devote space to the argument in their *Quaestiones* on the *De generatione*. For issues of infinite divisibility and the continuum, one has to turn to their *Quaestiones* on the *Physics*. The opposite is the case with Aegidius, since his major treatment of these issues is not in his *Physics* commentary, but rather in his two works on the *De generatione*.

10. For example, Albert of Saxony in his first question to Book VI of the *Physics* (Utrum continuum sit compositum ex indivisibilibus) cites as his fourth *argumentum principale*: "Quarto, primo de generatione, dicitur ubique in linea est punctus, sed hoc non esset nisi puncta essent in linea et sic linea componitur ex illis" (Albertus de Saxonia, *De octo libros Physicorum* (Paris, 1516), fol. 64$^{v}$). Similar references are found among the *argumenta principalia* in the initial question to Book VI of the *Physics* (though without specific citation of *De generatione* I) in Walter Burley (Gualterus Burlaeus, *Super Aristotelis libros de Physica* (Venezia, 1589), col. 722 and Nicolaus Oresmius, *Quaestiones super VII libros Physicorum*, MS Sevilla, Bibl. Colombina 7.6.30, fol. 66$^{r}$.

11. For example, Roger Bacon in his *Opus tertium* (Brewer), pp. 132-133 considers the possibility that: "Omne corpus potest dividi secundum omnia puncta." Similarly, William of Ockham in his *Summa logicae* (Boehner e.a.), p. 719 uses "secundum omne signum continuum esse actu divisum est possibile" as an example *de inductione universalium de possibili*. Much later, John Wyclif in his *Tractatus de logica* (Dziewicki), vol. 3, p. 35 cites Book VI of the *Physics*, Book III of the *De caelo* and Book I of the *De generatione* as giving Aristotle's view of continuity.

12. Cf. Aristoteles, *De generatione et corruptione* (Judycka).

(πάντῃ); as the medievals *interpreted* Aristotle, rather than translated him, no corresponding distinction is to be found.

Finally, I should indicate that the present list of protagonists for the medieval-Renaissance story of the reaction to this part of the *De generatione* reads: Averroes[13] (for always being there in the background), Albertus Magnus (especially for his misunderstanding), Aegidius Romanus (as the *communis expositor* for our text), John Buridan, Paul of Venice, with asides to Thomas Aquinas and Walter Burley, plus a peppering of Renaissance commentators. Being something of a work in progress I intend to add to this list, even though, at present, it contains so many *dramatis personae* that I shall be unable to deal with all of the twists and turns of the medieval-Renaissance reaction to these arguments.

## A Medieval Misunderstanding

Perhaps because this particular segment of the text in the *De generatione* is considerably complex, if not downright confusing, its medieval interpreters could be excused for not knowing precisely where Democritus is arguing straightforwardly, or where he is paying attention to an objection, or repeating an argument, let alone for not being aware of the juncture at which Aristotle enters the fray. But this will not explain why Albertus Magnus quite seriously misunderstands what is going on. In a few words, he ascribes almost everything, not to Democritus, but to Plato. Beginning from the contention that Plato said that a line is composed of points (since the flux of a point makes a line), a surface of lines, and solids of surfaces,[14] Albertus saddles him as well with the kind of πάντῃ (*omnino, ubique*) division called for by our argument.[15] Albertus also feels that

13. The second Arabic expositor of the *De generatione* known to the Latin West, Avicenna, has nothing to say about our argument.
14. Albertus Magnus, *De generatione et corruptione* (Hossfeld), p. 120: "Hic videtur digressione opus esse propter faciliorem doctrinam. Sciendum ergo Platonem posuisse compositionem physicorum corporum ex punctis et lineis et superficiebus, Democritum autem ex corporibus indivisibilibus. Ratio autem Platonis haec fuit, quia quocumque punctus moveatur, sequitur indivisibile, et ideo non perficit motu suo nisi lineam inter duo puncta existentem, scilicet punctum, unde motus, et punctum, in quo sistit motus; transitus autem puncti medius non fuit nisi puncti, et ideo lineam essentialiter et substantialiter ex punctis Plato esse dicebat. A simili ratione linea, secundum quod est mota ad dimensionem mediam, constituit superficiem; et id quod transit quasi fluente essentia, non est nisi linea, et ideo essentialiter dicebat superficiem esse ex lineis. Similiter quasi procedente et fluente essentia superficies ad latitudinem mota essentialiter constituit corpus, et ideo corpus essentialiter est superficies."
15. *Ibid.*, pp. 121, 123-124: "Voco autem *omnino* divisibile, quod dividi potest secundum omne punctum, quod essentialiter et potentialiter est in ipso, quia ita *omnino* divisibilem dixit Plato magnitudinem. ... Cum ergo dicit Plato corpus vel magnitudinem *ubique* esse divisibilem, resolvenda est locutio in hanc: possibile est magnitudinem *ubique* esse divisibilem, et distinguenda est haec ex compositione et divisione, quia si adverbium 'ubique' definiret verbum 'possibile,' vera est, quia tunc sensus est: *ubique*, id est in quolibet puncto, possibile est magnitudines dividi; si autem definiret verbum divisionis, falsa est, et est sensus: possibile est, ut magnitudo *ubique*, id est in quolibet puncto, dividatur; hoc enim est falsum, ut

it is Plato for whom the *causa deceptionis* is to be explained[16] and at whom the accusation is to be made of a concealed paralogism.[17]

Other medieval scholars maintained that Plato and the *mathematici* were mislead, but they also correctly maintained that the arguments were those of Democritus himself, arguments which, perhaps, Democritus had seen fit to adduce because of the views taken by Plato and the like.[18] But that is a far cry from Albertus ascribing so much of what was actually Democritus's doing to Plato. Albertus is apparently alone in that.

## The Consequences of Democritus's Argument

Turning to the specifics of the arguments, it will be convenient not to begin at the beginning, but rather at the consequents of the arguments, chiefly because the story contains fewer new elements and is less complicated here. Fortified by what the medievals knew of Aristotle's own refutation (especially from Book VI of the *Physics*) of the possible composition of continua out of indivisibles, they often confirmed what Democritus had maintained to be inadmissible, impossible, states of affairs. In particular, they were pleased with what Democritus had to say with respect to the through and through divisibility of a body implying its composition out of points. This "consequent" fitted extremely well with what Aristotle said elsewhere: the impossibility of points touching, or of being consecutive, of being incapable of causing any increase in the size of any magnitude to which they were added, etc.[19] Yet because Aristotle had less to say, if anything, about the "impossible consequents" of composition out of mere

prius patuit" (my emphasis).

16. *Ibid.*, p. 123: "Digressionem autem faciemus hic ad notitiam dictorum et dicendorum considerando causam deceptionis Platonis."
17. *Ibid.*, p. 125: In a chapter headed *Qualiter Plato latet paralogizans* (which glosses Arist. 317a1 et. seqq.) we find: "Tamen quando hoc ponit Plato, quod undique sit divisibilis, tunc videtur sibi, quod undique et ubique in magnitudines punctus sit contiguus vel continuus puncto, et ideo secundum eum necesse est dividere magnitudinem in nihil sive in puncta, ut diximus, eo quod ipse ubique ponit punctum esse possibilem accipi per divisionem et ideo dicit magnitudinem aut ex tactis punctis aut simpliciter ex punctis esse. Sed hoc est falsum."
18. Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 121$^{v}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 124$^{r}$: "Quia Plato et universaliter omnes mathematici videbantur resolvere corpora in superficies, superficies in lineas, lineas in puncta, ideo adducit [scil. Democritus apud Aristotelem] plures rationes ad ostendendum non posse corpora resolvi in puncta." Cf. the reference to Aegidius in note 2 above. Gualterus Burlaeus, *Expositio libri De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2151, fol. 150$^{v}$: "Sed quia magis rationale videtur quod corpora ultimo resolvantur in puncta secundum quod ponunt Platonici, ideo Philosophus adducit rationes ad ostendendum hoc specialiter esse impossibile." There follow three *rationes* that have nothing to do with those in our chapter.
19. Aristotle himself seemed to be referring to the relevance to Book VI of the *Physics* when in the course of the argument in the *De generatione* (317a2-3) he connected division through and through (πάντῃ) with the fact that points are not immediately next to (ἐχομένη) one another. Averroes certainly seems to have picked up on the point (Averroes, *Commentarium medium in Aristotelis De generatione et corruptione libros* (Fobes e.a.), p. 19): "Et esset possibile

nothings or out of *passiones*, the medievals themselves had correspondingly less to say in their comments.

But one additional "impossible consequent" is claimed for which there is no evidence in Democritus's or Aristotle's text. This has to do with the impossibility of a body being composed of surfaces. It occurs at Aristotle's mention (316a34) of the sawdust example (οἷον ἔκπρισμα).

Albertus Magnus is apparently the first to add this particular "impossible consequent." He tells us that someone might say that a body is not divided into points, but rather into surfaces — *ad superficies, quae dicuntur Graece perisimae*. Not only has he turned a transliterated *ekprisma* into *perisima*, but he has invented a fantasy etymology for the word (as indeed he was bound to); *peri* amounts to *circum* and *sima* is *curvitas*, making the whole like the peel of an apple (*purgamentum pomi*), because, he goes on, a *superficies circumvolvit corpus.*[20] *Quod erat demonstrandum*, or rather, he should have said, *imaginandum*.

The real culprit, however, is Aegidius Romanus, not because he has indulged in such make-believe as had Albertus, but because he has important followers in his "misdemeanor" in introducing a foreign element into Democritus's reasoning. Οἷον ἔκπρισμα reads *quasi rasura* in his text and he glosses this with: "that is, a surface which can be said to be a shaving [*rasura*] because it is at the extreme of a body" (*id est, superficies que potest dici rasura quia est in extremo corporis*). The connection is clear: *rasura*, revealed in its resemblance to a *rasorium*, is a shaving like unto the mere surface of that being shaved, *viz.*, a body.[21] Sawdust has been turned into a shaving and in the bargain Democritus has gained, whether he wished it or not, another inadmissible consequent.

ut divideretur super omnia puncta insimul, si puncta contingerent se adinvicem, quod est impossibile, sicut declaratum est in sexto *Phisicorum*."

20. Albertus Magnus, *De generatione et corruptione* (Hossfeld), p. 122: "Si autem forte aliquis dicat, quod corpus non ad puncta dividitur, sed ad superficies, quae dicuntur Graece perisimae, quia 'peri' circum sonat et 'sima' est purgamentum pomi a curvitate dictum, quia superficies circumvolvit corpus."

21. It is presently not possible to say with absolute certainty which Latin text of Aristotle Aegidius was glossing, save that he was aware of two versions (see "ut habet alia littera" in his comment below). Yet in all probability it was something like the following (316a34-b2): "Sed et si qua divisio quasi rasura fiat ex corpore et sic ex magnitudine quod corpus egrediatur, idem sermo" (See the Latin text, *ad loc.*, edited together with critical apparatus by Judycka, in note 12 above). The whole gloss to this lemma is the following (Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 122$^{r}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 124$^{v}$): "Deinde cum dicit: Sed et si qua divisio, ostendit divisionem corporis non posse stare ad superficies, quis si fiat aliqua divisio et quasi rasura, id est, superficies que potest dici rasura quia est in extremo corporis, et primo videtur attingi rasorio. Sed huiusmodi rasura et huiusmodi superficies fiat de corpore, ut quod corpus resolvatur in superficies, quia ex eisdem aliquid componitur in que resolvitur. Sequitur quod corpus egrediatur, id est quod corpus fiat et constituatur ex magnitudine vel ex dimensione (ut habet alia littera), id est, ex superficie, que potest dici magnitudo et dimensio secundum longitudinem et latitudinem, licet non sit magnitudo secundum profunditatem. Sed si hoc ponatur quod fiat corpus ex superficie,

Paul of Venice[22] follows Aegidius, almost verbatim, and John Buridan[23] also ascribes this additional, *rasura*, implication to Democritus. It might be thought that it would have been natural somehow to relate this unfounded addition to Plato, since in this very chapter of the *De generatione* it is said (315b30) that he regarded indivisible magnitudes as planes (*planities*), but no such ascription, as far as I have seen, is to be found.

## The Possibility of Infinite Divisibility

At this point, it will be well to turn to the argument as a whole, for although the medievals thus wished to agree for the most part with the *impossibilia* maintained by Democritus, they clearly wanted to safeguard Aristotle's positive sense or view of the infinite divisibility of continua. That is to say, because on this argument Democritus had also urged the infinite divisibility of bodies, they wanted to get a sense of a magnitude or body being divisible, or being divided, *secundum quodcumque punctum* or *ubique* which would be in keeping with this positive view of Aristotle.

To begin with, we need to remind ourselves of the fact that Democritus held that nothing impossible follows whether (a) a body *is divisible* through and through or whether (b) it *has been divided* through and through. Thus, according to Democritus, διαιρετόν/*divisibile* is not different on this score from διῃρημένον/*divisum*. There is no doubt that this is how Aristotle portrays him. Aegidius Romanus, whom Buridan and others regarded as the expositor par excellence of the *De generatione*, on behalf of Democritus drives this point home: "there is no inconsistency," he says, "in positing that a body has been simultaneously actually divided according to each and every point" (*non esse inconveniens ponere corpus esse simul actu divisum secundum unumquodque signum*).[24]

cum corpus sit magnitudo secundum profunditatem et non superficies, erit idem sermo qui prius et dicemus id quod prius dicebamus, videlicet quomodo corpus quod est divisibile et est magnitudo secundum profunditatem fiet supple ex non magnitudine secundum profunditatem, sequetur inconveniens quod prius dicebatur, scilicet ex non magnitudine magnitudinem fieri."

22. Paulus Venetus, *Expositio super libros De generatione et corruptione* (Venezia, 1498), fol. 11$^{r}$: "Vocat autem Philosophus superficiem rasuram que est in extremo corporis et primo attingitur rasorio."

23. Johannes Buridanus, *Expositio libri De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2162, fol. 128$^{v}$: "Quarto ostendit quod non remanent superficies que ymaginantur quasi rasure ex corpore."

24. Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 121$^{v}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 124$^{r}$. Note that Aegidius makes the contention of Democritus as strong as possible by adding the words "simul actu" to "esse divisum." As we shall see, Aegidius himself has doubts about this contention, but this does not prevent him from sharpening even more this bit of Democritus: "possibili posito in esse [namely the kind of *simul actu esse divisum* maintained in Aegidius's eyes by Democritus] non sequitur inde inconveniens."

On the other hand, contrary to what Democritus apparently believed, there clearly is a difference between a body being *divisible* and its being *divided*. The former is, as we shall see, possible; the latter really impossible (from which, in turn, Democritus has elicited his contention of a body's division into points or nothings). Again Aegidius: a body can indeed be divisible *secundum omne signum*, but the potency involved can never be reduced to a completed act (*ad actum completum*). This does not run counter to the principle "that, if something possible be posited in existence, no inconsistency follows" (*quod possibili posito in esse, nullum sequitur inconveniens*). This was a principle which was standard fare among medievals and had, as we have seen from Aristotle, been used to support Democritus's contention about infinite divisibility. Aegidius goes on to say, however, that a continuum can be divided in *infinitum secundum quodcumque signum*, but that such a division "is not one with respect to an act *in facto esse*, but with respect to an act *in fieri*" (*non est huius respectu actus in facto esse, sed in fieri*).[25] In his later *Quaestiones* on the *De generatione*,[26] he specifies that this kind of *actus in fieri* is what Aristotle is talking about with respect to the infinite in Book III of the *Physics* and is that involved in, to use Aristotle's own example, *sicut dies et agon* (206b14). That is to say that the infinite gets actualized or exists actually in the sense in which we say it is day or it is the games.[27] On the other hand, a continuum is not divisible in act and *in facto esse*. But Democritus reasons consistently as if the division of a continuum does have to do with this disallowed *actus in facto esse*,[28] and

25. Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 123$^{r}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 125$^{v}$; MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2182, fol. 69$^{v}$: "Corpus enim est divisibile secundum omnem signum continuativum, sed hec potentia nunquam reducitur ad actum completum, nec propter hoc negatur illud principium quod possibili posito in esse, nullum sequitur impossibile. Nam possibile debet poni in esse respectu actus secundum quem est possibile. Actus autem est duplex in fieri et in facto esse. Continuum autem ut est divisibile in infinitum et secundum quodcumque signum non est huiusmodi respectu actus in facto esse, sed in fieri. Ideo non debet poni actu divisum secundum quodcumque signum, potest tamen poni in actu in fieri. Nam si poneretur ipsum non esse divisum secundum quodcumque signum actu diviso et in facto esse, sed semper in dividi et in fieri, nullum nasceretur inde inconveniens. Sed de hoc plenius in declarationibus tractabitur. Ad presens tamen tantum dictum fuit sic quod complete solvitur dubitatio Democriti quantum ad omnem viam."

26. On the chronology of Aegidius's *Expositio* and his *Quaestiones* see Donati, "Studi," pp. 36-42, espec. pp. 37-39. Cf. the last two sentences in the previous note; the "declarationes" are Aegidius's *Quaestiones de generatione*.

27. Aegidius Romanus, *Quaestiones super primo libros De generatione et corruptione* (Venezia, 1505), fol. 56$^{v}$; MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2182, fol. 114$^{v}$: "Ideo Philosophus tertio Physicorum loquens de infinito ait: quod infinitum non oportet accipere sicut aliquid existens in actu et in facto esse, ut hominem aut homo, sed esse infinitum est sicut dies et agon, quibus esse non est ut substantia quedam facta, sed semper in eo quod aliquid fit. Si ergo de ratione infiniti est esse in fieri et non in facto esse, potentia respectu infiniti potest poni in actu in fieri, non in facto esse."

28. *Ibid.*: "Ex hoc autem solvuntur omnes rationes Democriti. Omnes autem rationes ille procedebant ac si divisio continui respiceret actum in facto esse."

it is precisely in that move, Aegidius maintains, wherein lies concealed the paralogism that Aristotle had ascribed to Democritus. Had Democritus argued from the permissible, *actus in fieri* sense of the division of a continuum, his arguments would be inconclusive.[29]

The application of logic to this particular issue naturally becomes more frequent as one moves into the fourteenth century as it does with almost any philosophical and even theological problem. Essentially, however, the challenge remained the same: how to safeguard the permissible, Aristotelian sense of the divisibility of continua from that inadmissible sense contained in Democritus's arguments.

Thus, in MS Vat. lat. 3097, which, as Hans Thijssen has argued convincingly, seems to contain an alternate redaction of John Buridan's *Quaestiones* on the *De generatione*, the familiar distinction of the divisive *vs.* the composite sense is brought to bear on the problem involved in Democritus's argument.[30] It is maintained, for instance, that those propositions at the critical juncture of Democritus's argument are false: namely, *Possibile est corpus dividi super omne signum* and *Possibile est corpus esse divisum super omne signum*. The reason for their falsity rests in the fact that they are *propositiones de possibili in sensu composito* and hence imply the corresponding *de inesse* propositions.[31] But these are, in turn, obviously false, since the infinite divisibility of such bodies or magnitudes can never be actually completed, the contrary of which the *de inesse* propositions assume. On the other hand, propositions claiming the possibility of the infinite division of continua *in sensu diviso* are true, since they represent the intention of Aristotle with respect to this matter.[32] Needless to say, Buridan is followed in applying this distinction of the divisive *vs.* composite sense of propositions to questions of infinite divisibility by Paul of Venice[33] and many others.

29. *Ibid.*: "Latet ergo Democritus paralogizans arguens de divisione continui ac si respiceret actum in facto esse, quo sublato et ostenso quod respicit actum in fieri rationes eius non concludunt."
30. Thijssen, "Buridan." In the relevant question (Utrum corpus sit divisibile super omne signum vel super omne punctum sui, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fols. 110$^{v}$-112$^{r}$), Buridan is primarily interested in the issue involved and mentions Democritus by name only once.
31. Johannes Buridanus, *Quaestiones super libros De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fol. 111$^{v}$: "Quarta conclusio: quod hec non est vera: Possibile est corpus dividi super omne signum, vel etiam illa: Possibile est corpus esse divisum super omne signum. Ratio est quia tales propositiones de possibili in sensu composito nihil aliud significant nisi quod ille propositiones de inesse que respectu talis modi subiciuntur vel predicantur, sunt possibiles, et sic ille sunt false."
32. *Ibid.*: "Et illa fuit vera intentio Aristotelis et Commentatoris, quia non ponunt differentiam si terminus discretus [scil. 'possibile'] ponatur a parte ante sive a parte post, sed de potentia et actu propter hoc quod dicunt possibile in potentia volunt quod in sensu diviso est vera et non in actu, id est, quod propositio in sensu composito est falsa, et sic est impossibilis in actu."
33. Paulus Venetus, *Expositio super libros De generatione et corruptione* (Venezia, 1498), fol. 10$^{v}$: "Consequentia quam facit Democritus non valet: Aliquod corpus potest esse actu divisum

In his *Expositio* on the *De generatione* as contrasted with his *Quaestiones* on this work, Buridan adopts a different tack, but to the same effect. The proposition *Corpus secundum quodlibet eius signum est divisibile* is true, he tells us, if *est divisibile* is expounded *potest dividi*, but false, if it receives the exposition *est divisum* because it then is a question of *de actu* and *de inesse* division.[34] Again, the true Aristotelian sense of infinite divisibility is separate from the false Democritean one.

Similarly, in the alternate redaction of his *Quaestiones* on the *De generatione*, Buridan devotes a good deal of time to what he refers to as an *axioma de loyca* that is directly applicable to Democritus's reasoning. The axiom is one we have met before: *Possibili posito in esse, nichil sequitur impossibile* and is indeed of direct relevance to Democritus's claim that nothing impossible follows from his contention of the through and through divisibility of bodies. But the problem is that an impossibility *does* follow from the *de inesse* proposition asserting that a body is divisible, or has been divided, *super omne signum*. What Buridan, and the other medievals as well, have tried to do is to have Democritus admit to the fact that the only reason why he was able to infer the inadmissible situation of a body being divided into points or nothings in the first place is because the original *esse divisum*/εἶη διῃρημένον division does involve an impossibility. Therefore, Democritus's procedure constitutes an exception to the *possibili posito in esse* axiom or, alternatively, the axiom is not true as it stands.[35] And the same is true, Buridan tells us, with other logical rules applied

secundum quodlibet signum eius, igitur possibile est quod sit actu divisum secundum quodlibet signum eius, quia arguitur a sensu diviso ad sensum compositum, falsum est argumentum."

34. Johannes Buridanus, *Expositio libri De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2162, fol. 129$^{r}$: "Solvit rationem Democriti, scilicet quod ponendo corpus divisum secundum quodlibet signum sequitur impossibile. Unde hec est impossibilis: Corpus secundum quodlibet eius signum est divisum, et tamen hec est vera: Secundum quodlibet eius signum est divisibile. Unde dicit Aristoteles ista propositio: Corpus secundum quodlibet eius signum est divisibile potest distingui: uno modo quod sit de possibili ita quod exponitur 'est divisibile,' id est, 'potest dividi,' et sic propositio est vera; alio modo improprie exponendo posset intelligi quod esset de actu, id est, de inesse ita quod exponeretur 'est divisibile,' id est, 'est divisum,' et sic propositio est falsa et impossibilis."

35. Johannes Buridanus, *Quaestiones super libros De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fol. 111$^{r}$: "Et arguitur [scil. utrum corpus sit divisibile super omne signum] primo quod non per rationes Democriti, quia possibili posito in esse, nichil sequitur impossibile; sed si ponatur quod corpus sit divisibile secundum omne signum sequitur impossibile, ergo non est possibile corpus dividi secundum omne signum. Maior est anxioma in loyce (loyca *exspectes*) et patet Priorum; minor demonstratur, quia posito quod continuum sit divisum secundum omne signum vel punctum, queretur quid restaret? Et non posset dici quod restarent nisi puncta nullam extensionem habentia, quia, si restarent magnitudines alice habentes extensionem, adhuc non esset divisio facta super omne signum, ymmo remaneret aliquod signum super quod non esset facta divisio, contra positum. ... Ad rationes: possibili posito in esse etc, concedo, id est, si propositio possibilis ponatur in esse vera, nichil sequitur impossibile. Sed ultra, si ponatur in esse corpus sit divisum super omne signum sequitur impossibile, verum est, quia nunquam illa propositio fuit possibilis: corpus dividitur super omne signum."

by (unnamed) *moderni*:[36] they all amount to attempts to rule out the corresponding *de inesse* forms of our divisibility proposition since such forms, sooner or later, are seen to imply an impossibility.

Paul of Venice adopts a slightly different manner of resolving the issue. He argues that, in general, the logical axiom cited by Buridan is to be observed. But, he adds, there is a difference between a *propositio possibilis* and one that is *de possibili*. It is true that, "if a possible proposition be posited in existence, no inconsistency follows" (*posita propositione possibili in esse, nullum sequitur inconveniens*); the sample proposition he gives of this is "homo erit." On the other hand, "if a *de possibili* proposition be posited in existence, *sometimes* an inconsistency *does* follow" (*posita tamen propositione de possibili in esse, aliquando sequitur inconveniens*); his sample proposition in this case is "album potest esse nigrum."[37] Unfortunately, though Paul clears the air with numerous examples, he never applies his claimed difference between *propositiones possibiles* and *propositiones de possibili* to Democritus's contentions about the divisibility of bodies.

If he had done so, he would probably have realized, along with Buridan and others who had employed the *possibili posito in esse* axiom, that a fundamental difficulty is to be located in the fact that the divisibility of continua or magnitudes involved a peculiar kind of possibility or potency, namely, an infinite one, which is to say that it is one that can never be completed, and that is why the *de inesse* proposition implied by this axiom suffers an exception.

This is, in effect, the solution to the supposed generality of the *possibili posito in esse* axiom proposed by William of Ockham. That is, there is something peculiar about the proposition asserting the potential infinite divisibility of continua that will *not* allow one to formulate the corresponding affirmative *de inesse* proposition. This is because the proposition asserting this potential infinite divisibility contains as one of its exponents a negative *de inesse* proposition: namely, "some part of the continuum has not been divided" (*aliqua pars continui non est actu divisa*). And that constitutes an exception to the *possibili posito in esse* rule.[38]

36. *Ibid.*, fol. 111$^{r}$ (giving the logical rules alone and not their application by Buridan to the Democritean argument): "Tertio arguitur ad principale per duas rationes quorundam modernorum. Prima predicatum appellat formam, ut dicit regula loycalis, et ideo si propositio de possibili in sensu diviso sit vera, tunc quod propositio de inesse ubi predicatum in eadem forma reservatur sit possibilis vel debet esse possibilis. ... Item arguit per aliam regulam que est quod ad omnem propositionem de possibili in sensu diviso ubi subicitur terminus discretus vel terminus communis particulariter aut indefinite sumptus, ad talem propositionem sequitur propositio de inesse in qua loco subiecti prioris accipitur pronomen demonstrativum demonstrato eo pro qua subiectum supponebat ista propositio de inesse, sequitur quod sit possibilis."
37. Paulus Venetus, *Expositio super libros De generatione et corruptione* (Venezia, 1498), fol. 10$^{v}$.
38. Guillelmus de Ockham, *Expositio in libros Physicorum* (Richter), pp. 556-557. Cf. the quotation and analysis of this text in Murdoch, "William of Ockham," pp. 194-195.

## Points as *ubique*

As if it were not enough to preserve the proper Aristotelian sense of the infinite divisibility of magnitude, additional attempts are made to safeguard the Aristotelian view of points within these magnitudes being *ubique* (keeping in mind that the divisibility counseled by Democritus as πάντῃ was often translated by *ubique*).

Thomas Aquinas has something to say in passing in this regard,[39] but once again it is Aegidius Romanus who takes the real lead. First the true, Aristotelian view: points are *ubique* in a line *per comparationem ad partes linee* because there is no part of a line in which there is not a point and because there exist points joining any part of a line with any other and also because there is a point falling between any two parts of a line. On the other hand, there is not a point *ubique per comparationem ad punctum*, because that would mean that points would be continuous with points or points would be joined to points, either of which is inadmissible.[40] In this, Paul of Venice, and in the Renaissance, Didacus de Astudillo, closely follow Aegidius, often verbatim.[41]

39. Thomas Aquinas, *In Aristotelis libros De caelo et mundo, De generatione et corruptione, Meteorologicorum expositio* (Spiazzi), Lib. I, lect. 5, p. 339. Thomas believed that the *tota virtus primae rationis Democriti* is to be found in the following consequence: "Si corpus sensibile est simul omnino divisibile in potentia, quod sit simul omnino divisum actu." But this consequence, Thomas cautions, does not hold in all things, among which most importantly is mathematics: "Nam divisio lineae in actu nihil aliud est quam punctus. Si ergo linea esset simul omnino in actu divisa, oporteret quod punctus esset *ubique* in actu in linea, et ita oporteret quod puncti essent contigui vel consequenter se habentes in linea. Hoc autem non potest esse." See also the statements made by Albertus Magnus on *ubique* in note 15 above.

40. Aegidius Romanus, *Quaestiones super primo libros De generatione et corruptione* (Venezia, 1505), fol. 55$^{v}$: "Notandum ergo cum queritur utrum punctus sit ubique in linea, si ly ubique respiciat partes linee, vera est. Per comparationem enim ad partes linee punctus est ubique; nulla enim pars linee in qua non est punctus et iuxta quamlibet partem linee et semper inter duas partes linee existit punctus. Sed si ly ubique non respiciat partes linee, sed puncta, sic punctus non est ubique. Non est enim punctus per comparationem ad punctum ubique, cum non sit punctus iuxta punctum. Et ita est sermo Philosophi in littera qui concedit punctum esse ubique et non esse ubique. Esse autem ubique in quantum tota linea pariter et equaliter est una et continua, et quia quelibet pars linee ubique alteri parti continuatur per comparationem ad partes linee, est dare punctum. Non autem est ubique punctus, ut in littera dicitur, quia plures puncti non sunt simul vel consequenter, cum non sit punctus iuxta punctum." Here Aegidius has filled out what he maintained in his *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 123$^{r}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 125$^{v}$: "Deinde cum dicit: Hoc autem est quod existit (317a8-9), ostenso quomodo non est continuum ubique divisibile, quia non est ubique punctus, cum non sit punctus iuxta punctum, ostendit quomodo potest concedi corpus esse ubique divisibile et ubique esse punctum. ... Est ergo punctus ubique per comparationem ad partes linee, quia in omni parte linee et iuxta quamlibet partem linee est punctus; sed non est punctus ubique per comparationem ad punctum, quia non est punctus iuxta punctum."

41. Paulus Venetus, *Expositio super libros De generatione et corruptione* (Venezia, 1498), fol. 13$^{v}$: "Ubique in linea est punctus; comparando enim punctum ad totam lineam et ad partes linee, sic ubique in linea est punctus ... comparando enim punctum ad punctum sic non ubique in linea est punctus." Didacus de Astudillo, *Quaestiones super II libros De generatione* (Valladolid, 1532), fol. 51$^{r}$, putting a logical twist on the conceptions at hand: "Non ergo est absolute

Another way of safeguarding the Aristotelian sense of points being *ubique* is taken by Buridan in his alternate redaction of his *Quaestiones* on our text. If we mean to assert, he says, that a point is an indivisible thing existing in a line, then points are not *ubique* (indeed, following what Buridan says elsewhere,[42] there are not any points at all, taken in this sense). On the other hand, taking *punctum* as a *nomen privativum* then we can derive proper meaning to points being *ubique*: namely, "between the parts that are continuous, there is no divisibility" (*quod inter partes continue se habentes nulla est divisibilitas*). For that is all that it means for a point to be in a line. It is a dividing that falls between parts between which nothing is, or remains, divisible (*dividens cadat inter partes inter quas nichil est divisibile*).[43]

## Divisive and Continuative Points

There is one other major development or distinction relative to Democritus's arguments that bears mention. Once again it is due to Aegidius Romanus. Considering the centrality of his *Expositio* and *Quaestiones* on the *De generatione* during the Middle Ages and the Renaissance,[44] it is perhaps fitting that we end our account with something he had invented. It has to do with a distinction between *puncta* or *signa* which are *divisiva* and *puncta* or *signa* which are *continuativa*.[45]

At the very beginning of his *Expositio* of Democritus's arguments, Aegidius claims that he ought to have realized this distinction because, as it turns out, it would have been very much to his advantage. He should have claimed, Aegidius says, that bodies were divisible *secundum quodlibet signum divisivum* but not *secundum quodlibet signum continuativum*. For, given this first kind of division

concedendum esse ubique punctum et divisionem, nec est absolute negandum esse ubique, sed utrumque in aliquo sensu concedendum. Est autem sensus in quo concedendum ubique esse punctum, ut ly ubique distribuat pro partibus linee tantum, quia non est aliqua pars linee in qua non sit punctus. Est autem negandus sensus ut ly ubique omnino universaliter distribuat, ita qua punctus pure immediate iungatur. Et iste sensus ex rationibus dicitur Philosophi, ut bene hic exponit Egidius."

42. For example, Johannes Buridanus, *Quaestiones super octo Physicorum libros Aristotelis* (Paris, 1509), Lib. VI, Q1, Concl. 3, fol. 94$^{v}$: "Nulla sunt puncta in linea que sunt res indivisibiles."
43. Johannes Buridanus, *Quaestiones super libros De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fol. 112$^{r}$ (in reply to a principal argument claiming that if a body is not divisible *ubique*, then it is not divisible *super omne signum*): "Si tamen hoc nomen punctum ponatur nomen privativum divisibilitatis, tunc dico quod illa est vera: Corpus est divisibile super aliquod punctum, sub hoc sensu quod ipsum corpus dividens potest cadere in dividendo inter partes inter quas nulla est divisibilitas. Similiter punctum esse in linea nihil aliud significat nisi quod inter partes continue se habentes nulla est divisibilitas. Unde dividens cadat inter partes inter quas nihil est divisibile."
44. Thus, at the end of a prologue to his *Quaestiones super libros De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fol. 103$^{v}$, Buridan remarks: "Nota quod Expositor communis huius libri Egidius facit hic magnam vim de voce."
45. Unfortunately, Aegidius does not directly define this distinction, but it is evident from what he says in its application to Democritus's arguments.

entailing only *signa divisiva*, there would remain continuous *corpora indivisibilia* because they would still have "*signa* which were *continuativa* which were not *divisiva*" (*signa que erant continuativa que non erant divisiva*).[46] But this is the kind of indivisible bodies that Democritus wants to establish the existence of by his arguments.

Paul of Venice carries Aegidius's distinction further (indeed, among figures later than Aegidius I have thus far found this distinction only in Paul). Consider, he says, the following objection to Democritus: if a body is divisible *secundum quodlibet signum* and this body is composed *ex atomis continuis*, then it would follow that such a body would be divisible *secundum quodlibet signum atomorum*, and consequently atoms would be divisible. In the reply to this objection Paul puts Aegidius's distinction in the mouth of Democritus himself: some *signa* within a continuum are, at one and the same time, *divisiva* and *continuativa*, others are *continuativa tantum*. These are "*signa* which continue the parts of atoms" (*signa continuantia partes atomorum*); the *signa divisiva*, however, "continue the atoms with one another" (*continuant atomos invicem*).[47]

46. Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 121$^{v}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 124$^{r}$, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2182, fol. 68$^{r}$: "Hic inquirit (316a15) Philosophus de positione Democriti; ad cuius evidentiam notandum quod cum Democritus poneret corpora indivisibilia et omne corpus sit quid continuum, oportebat eum dicere esse aliqua signa continuativa que non erant divisiva; corpora ergo secundum ipsum erant divisibilia secundum quodlibet signum divisum, non autem secundum quodlibet continuativum. Ex his ergo dupliciter venabatur esse corpora indivisibilia. Primo ex eo quod corpora erant divisibilia secundum quodlibet signum divisum; nam secundum eum, hac divisione facta, ut patebit, non remanebant nisi corpora indivisibilia. Secundo probat hoc idem eo quod corpora non erant divisibilia secundum quodlibet signum continuativum; nam facta divisione secundum omnia signa divisiva, remanebant corpora continua indivisibilia, cum essent in eis signa que erant continuativa que non erant divisiva." Later in the *Expositio*, Aegidius applies this distinction of the two types of *signa* to Aristotle's restatement of Democritus's argument (316b22-28) to the effect that the potential divisibility of a body might actually occur and then the body's composition out of points or mere nothings would ensue. Such a consequence would be entailed, Aegidius feels, by dividing the body by both types of *signa* (Aegidius Romanus, *Expositio super libros De generatione et corruptione* (Venezia, 1500), fol. 122$^{v}$; MS Paris, Bibliothèque Nationale, lat. 14714, fol. 125$^{r}$, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2182, fol. 69$^{v}$): "Diviso corpore secundum unumquodque signum non solum divisivum sed etiam continuativum, non remanebit aliquod continuum ... erit ergo corpus corruptum [i.e., it would disappear into points or mere nothings]. Et quia impossibile est secundum talia componi et dissolvi corpus, impossibile corpus dividi secundum quodlibet signum continuativum. Completa ergo divisione secundum signa divisiva, remanentibus solum signis continuativis, reliquum erant continua corpora indivisibilia." It is also to be noted that Aegidius, referring to the same argument of Democritus, applies the *divisiva/continuativa* distinction to the same effect in his *Quaestiones super primo libros De generatione et corruptione* (Venezia, 1505), fol. 56$^{v}$, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2182, fol. 114$^{v}$.

47. Paulus Venetus, *Expositio super libros De generatione et corruptione* (Venezia, 1498), fol. 10$^{v}$: "Dubitatur contra Democritum, si enim aliquod corpus est divisibile secundum quodlibet signum eius, cum ipsum componatur ex athomis continuis, sequitur tale corpus esse divisibile secundum quodlibet signum athomorum, et per consequens athomi sunt divisibiles, quod est contra ipsum. Respondebat Democritus quod duplicia sunt signa in continuo, videlicet divisiva

Aegidius, and even more clearly Paul, would have Democritus maintaining something like Epicurus's notion of minimal parts, i.e., parts within an atom[48] (an anticipation of which we have no good reason to ascribe to Democritus). Perhaps, because there were non-Aristotelians in the Middle Ages who maintained the composition of continua out of points or non-extended indivisibles,[49] whereas Democritus opted for indivisible *bodies*, Aegidius and his fellow Augustinian Hermit wanted to make clear what Democritus's *corpora indivisibilia* amounted to and they saw in the distinction of *signa divisiva vs. continuativa* a way to bring out the "physicality," as it were, of Democritean atoms.

Thus, perhaps what Aegidius Romanus and Paul of Venice say may have expressed what they believed to be one of the essential properties of *corpora indivisibilia*, one which emphasized that, although they were indivisibles, yet they had some size or other, howsoever small.

But they seem to have forgotten, at least temporarily, that Democritus had argued for his *corpora indivisibilia* on grounds of the inadmissible, indeed impossible, circumstances that would ensue upon the through and through, πάντῃ, division of bodies or magnitudes. For how could he have meant to limit this division, as Aegidius and Paul contend, to only *signa divisiva*? In particular, if this limitation stands, then, at least in Paul's interpretation, Democritus could have argued for his *corpora indivisibilia* directly (since, recall, the *signa divisiva continuant atomos invicem*), rather than by a kind of *reductio ad impossibile*.[50] To this apparent inconsistency in their account of Democritus's arguments, they have, as far as I can see, no answer.

et continuativa, sic quod aliqua sunt simul divisiva et continuativa, aliqua autem continuativa tantum, et ista sunt continuantia partes athomorum; signa autem divisiva continuant athomos invicem. Dicebat ergo corpora naturalia esse divisibilia secundum omnia signa divisiva, non autem secundum omnia signa continuativa. Propterea, in hac propositione: 'Aliquod corpus est divisibile secundum quodlibet signum eius,' non distribuitur ly signum apud Democritum pro quolibet signo, sed tantum pro omni signo divisivo."

48. Cf. Epicurus, *Letter to Herodotus* as in Diogenes Laertius, *Vitae philosophorum* (Long), Lib. X, 58-59.

49. For instance, Henry of Harclay, Walter Chatton, Gerard of Odo, and Nicolaus Bonetus, on which, see Murdoch, "Infinity and Continuity," pp. 575-584.

50. To get down to cases: if Democritus divided a body only in all its *signa divisiva*, how could he have derived the impossible consequent of it being reduced to points or mere nothings? This is a crucial move on Democritus's part, since it is from this impossible consequent (and others of this sort) that he infers that there must be indivisible magnitudes or bodies, i.e. his atoms. Aegidius, if not Paul, recognizes that such impossible consequents follow *only* if there is a division according to *both signa divisiva* and *signa continuativa*. But then why does Aegidius (and Paul as well) maintain Democritus opted for division in *only signa divisiva*?

# "Utrum, corrupta re, remaneat eius scientia." Der Lösungsversuch des Aegidius Romanus und seine Nachwirkung auf spätere Kommentatoren der Schrift *De generatione et corruptione*[1]

*Silvia Donati*

## Einführung

Die Frage: "Utrum, corrupta re, remaneat eius scientia," oder ähnliche Fragestellungen werden in den mittelalterlichen Kommentaren zur Schrift *De generatione et corruptione* häufig behandelt. Unter diesem Titel faßt man das Problem der Gültigkeit unserer Erkenntnis von einem Gegenstand zu dem Zeitpunkt, zu dem er nicht mehr aktuell existiert. Es handelt sich um eine Problematik, die mit klassischen Themen der mittelalterlichen Sprachphilosophie eng verwandt ist, inwieweit nämlich Begriffe wie "Bezeichnung" und "Wahrheit" in bezug auf eine leere Klasse anwendbar sind.[2] Daß derartige logisch-erkenntnistheoretische Fragen in Kommentaren zu den *libri naturales* einbezogen werden, ist durchaus berechtigt, denn zum Bereich der Naturwissenschaften gehören auch Gegenstände, deren Existenz nur zeitlich begrenzt ist, so daß für sie der Fall der leeren Klasse häufig auftritt. Klassische Beispiele dafür sind Arten von Naturdingen wie die Rose oder natürliche Ereignisse wie die Mondfinsternis. Rosen gibt es — oder gab es zu jener Zeit — nur im Frühling und im Sommer. Die Finsternis, obwohl sie von Aristoteles zu den Phänomenen, die häufig geschehen ("quae saepe fiunt"), gezählt wird,[3] ereignet sich nur selten. Für den Naturphilosophen stellt sich darum die Frage nach der Grundlage der Erkenntnis, wenn ihr kein aktuell existierender Gegenstand entspricht. Wird

1. Der vorliegende Beitrag ist das Ergebnis einer Untersuchung, die durch ein Stipendium der Deutschen Forschungsgemeinschaft (Bonn) ermöglicht wurde. Ich bin Herrn Thomas Dewender und Herrn PD Dr. Andreas Speer (Thomas-Institut, Köln) für die Korrektur der deutschen Übersetzung sehr dankbar. Das Thema des Beitrages ist teilweise in dem Aufsatz: Donati, "Das Problem," schon behandelt worden, auf den für eine ausführlichere Darstellung der Lehre des Aegidius Romanus und für eine detailliertere Literaturangabe verwiesen sei.

2. Dazu cf. z.B. Pinborg, "Bezeichnung."

3. Aristoteles, *Analytica posteriora*, I, 8, 75b33-36.

unser Wissen unter diesen Umständen seinen Wahrheitswert behalten oder verliert es grundsätzlich seine Geltung?

Thema des vorliegenden Aufsatzes ist der Lösungsversuch des Augustiner-Magisters Aegidius Romanus, der im letzten Viertel des 13. Jahrhunderts an der Pariser Universität tätig war und unter anderem mehrere Werke des Aristoteles kommentierte.[4] Dieses Lehrstück, das im Kommentar des Aegidius zur Schrift *De generatione et corruptione* vorkommt,[5] ist nicht nur in theoretischer, sondern auch in historischer Hinsicht von Bedeutung, denn von früheren Kommentatoren wie z.B. Albert dem Großen, dem Engländer Gottfried von Aspall, Thomas von Aquin oder Boethius von Dacien wird unsere Frage nicht eigens thematisiert.[6] Dem Augustiner-Magister dürfte darum das Verdienst gebühren, die genannte Fragestellung aus dem logischen Bereich der Sophismataliteratur[7] übernommen und in diesen naturwissenschaftlichen Kontext eingeführt zu haben.

In späteren Kommentaren zur Schrift *De generatione* scheint dagegen dieses Thema zu einem Topos zu werden, so daß es noch von einem Autor wie Johannes Buridanus diskutiert wird.[8] Im zweiten Teil dieses Beitrages werden wir deshalb den weiteren Verlauf der Diskussion in einigen ungedruckten Sammlungen von Quästionen vom Ende des 13. bis zum Anfang des 14. Jahrhunderts verfolgen. Wie sich in der folgenden Analyse herausstellen wird, zählt zu dieser Zeit die Position des Aegidius Romanus zu den klassischen Lösungen, mit denen die späteren Autoren sich immer wieder auseinandersetzen.

4. Zu Leben und Werk des Aegidius Romanus cf. Del Punta e.a., "Egidio Romano." Zu den Kommentaren des Aegidius Romanus zum *Corpus Aristotelicum* cf. Donati, "Studi."
5. Cf. *infra*, Anm. 10.
6. Von Albert dem Großen, Gottfried von Aspall und Boethius von Dacien wird im allgemeinen die Frage nach der Möglichkeit einer wissenschaftlichen Erkenntnis vergänglicher Dinge behandelt, sie gehen aber auf das Problem der leeren Klasse thematisch nicht ein. Dazu cf. Albertus Magnus, *De generatione et corruptione* (Hossfeld), I, tract. 1, cap. 1, pp. $109^{29}$-$110^{6}$; Boethius Dacus, *Quaestiones De generatione et corruptione* (Sajó), pp. 13-15. Was den Kommentar Gottfrieds von Aspall betrifft, beziehe ich mich auf die Quästionen zum ersten Buch der Schrift *De generatione et corruptione*, die im MS Oxford, New College, 285, fols. $38^{ra}$-$57^{vb}$, überliefert werden (für die betreffende Frage cf. fol. $38^{ra}$). Was die Entstehungszeit dieser drei Werke betrifft, geht Alberts Kommentar auf die Jahre um 1251 – 1254 zurück; dazu cf. Hossfelds Einführung, p. V. Zu den Aristoteleskommentaren Gottfrieds von Aspall, die wahrscheinlich in den Jahren vor 1264 entstanden sind, cf. Macrae, "Geoffrey of Aspall's Commentaries." Die Quästionen des Boethius von Dacien dürften nicht später als 1271 verfaßt worden sein; dazu cf. Sajós Einführung, pp. LX-LXI. Zur Entstehungszeit des Kommentars des Aegidius Romanus cf. *infra*, Anm. 9.
7. Vgl. z.B. die bekannte Quästio Sigers von Brabant: "Utrum haec sit vera: homo est animal, nullo homine existente," oder die Quästio: "Utrum rebus corruptis oporteat corrumpi scientiam de rebus," im Sophisma des Boethius von Dacien: "Omnis homo de necessitate est animal." Zu diesen Texten cf. Siger de Brabant, *Écrits de logique, de morale et de physique* (Bazán), pp. 53-59; Grabmann, *Die Sophismataliteratur*, pp. 84-89.
8. Donati, "Das Problem," pp. 386-387, Anm. 11.

## Die Lösung des Aegidius Romanus: das *esse in suis causis*

Aegidius Romanus hat bekanntlich zwei Werke über die aristotelische Schrift *De generatione et corruptione* verfaßt, nämlich einen vollständigen Kommentar aus der literarischen Gattung der *Sententiae* und eine Sammlung von Quästionen, die sich aber nur über die Kapitel 2 bis 5 des ersten Buches erstreckt. Beide Werke, die später als der Kommentar des Thomas von Aquin entstanden sein dürften, gehen auf die Jahre um 1274 zurück.[9] Die Quästio: "Utrum, corrupta re, remaneat eius scientia," findet sich am Anfang der *Sententia*.[10]

Die genannte Frage wird von Aegidius positiv beanwortet: Selbst wenn der Gegenstand der Erkenntnis vergangen ist, bleibt noch eine Wissenschaft im eigentlichen Sinne möglich. Bei der Behandlung dieses Problems befaßt er sich mit zwei verschiedenen Grundlösungen. Auf die zweite Lösung, welche als die Lehre von der *scientia sub condicione* bezeichnet wird, kommen wir im folgenden zurück, denn sie wird von einigen der späteren Autoren, die wir noch behandeln werden, übernommen. Zur Charakterisierung der Meinung des Aegidius ist allerdings der erste Lösungsversuch bei weitem wichtiger. Es handelt sich um eine Theorie, die als typisch essentialistisch zu bezeichnen ist. Weil nun die Lehre des Aegidius Romanus ebenfalls in den Rahmen der essentialistischen Tradition fällt, geht es ihm in erster Linie darum, seine eigene Position von jener seiner Vorgänger genau abzugrenzen.

Ausgangspunkt des von Aegidius referierten Lösungsversuchs[11] ist die Unterscheidung zwischen zwei Arten des Seins, nämlich des *esse actuale*, d.h. der aktuellen Existenz, und des *esse essentiae* oder Wesensseins. Wenn ein Ding gemäß seinem *esse actuale* vergeht — so lautet diese Antwort — kann es gemäß seinem *esse essentiae* fortbestehen. So bleibt die Wahrheit der Wissenschaft gewahrt. Wie auch von den Kritikern dieser Theorie hervorgehoben wird, liegt ihr offenbar das klassische Verständnis der Wissenschaft im eigentlichen Sinne zugrunde, nämlich als der Erkenntnis, die sich auf die durch die Wesensdefinition erfaßte Natur des Gegenstandes und auf die von der Natur herrührenden Eigenschaften richtet.[12] Weil nun die Natur des Gegenstandes erhalten bleibt,

9. Zur Datierung und Struktur der beiden Kommentare des Aegidius Romanus cf. Donati, "Studi," Teil I, pp. 36-42, Teil II, pp. 5-11. Zu den literarischen Gattungen der *Sententiae* und der Kommentare *per modum quaestionis* cf. Weijers, *La "disputatio"*, pp. 11-40.
10. In Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fol. $3^{rb-vb}$.
11. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{rb}$.
12. Cf. z.B., Aegidius Aurelianensis, *Quaestiones super De generatione et corruptione*, MS Firenze, Biblioteca Nazionale Centrale, Conv. Soppr. E.1. 252, fol. $142^{rb}$ (zu diesem Werk cf. *infra*, pp. 110-115): " ... Una opinio est quod res habet duplex esse, scilicet esse actualis existentiae et habet esse essentiae; modo, res corrupta quantum ad esse actualis existentiae, potest manere quantum ad esse essentiae, ut dicunt. Et ideo, re corrupta quantum ad esse actualis existentiae, potest adhuc scientia manere de ipsa, quia propria passio quae inest subiecto inest sibi per essentiam suam, quia immediate consequitur essentiam subiecti; et ideo, quamvis

so behält die wissenschaftliche Erkenntnis durchaus ihre Geltung. Ebenso wie später die Auffassung des Aegidius zählt auch die Lehre vom *esse essentiae* zu den klassischen Antworten auf die Frage nach dem Wahrheitsgrund des wissenschaftlichen Erkennens. Sie wird bereits in der Quästio Sigers von Brabant: "Utrum haec sit vera: homo est animal, nullo homine existente,"[13] wie auch in dem Sophisma des Boethius von Dacien: "Omnis homo de necessitate est animal,"[14] erwähnt und im späteren Verlauf der Diskussion immer wieder zitiert.

Was den philosophischen Inhalt dieser Lösung betrifft, wird dabei die Notwendigkeit des wissenschaftlichen Satzes sozusagen einfach durch die Annahme eines unvergänglichen Gegenstandes verbürgt, der das ontologische Fundament der Wahrheit darstellt. In erkenntnistheoretischer Hinsicht scheint nun eine solche Ansicht einwandfrei. Problematisch hingegen sind ihre ontologischen Voraussetzungen. Der Gedanke, die Wesenheit bliebe erhalten, auch wenn ihre Träger zerstört werden, klingt nämlich für die hier untersuchten Autoren zu stark platonisch. In diese Richtung weist die Kritik des Aegidius Romanus. Er geht von dem Prinzip aus, die Wesenheit sei allgemein und die Universalien existieren nur in den Individuen; ganz folgerichtig gelangt er dann zum Schluß, beim Vergehen der Individuen vergehe *per accidens* auch die Wesenheit.[15] Bei späteren Autoren werden sich solche Einwände immer wiederholen, so daß dieser Lösungsversuch sogar ausdrücklich als eine Wiederaufnahme der platonischen Lehre von den abgetrennten Formen stigmatisiert wird.[16]

Mit der soeben dargestellten Theorie teilt Aegidius Romanus die Auffassung, daß der eigentliche Gegenstand der Erkenntnis die Wesenheit ist, denn nach seiner Ansicht sieht die wissenschaftliche Erkenntnis von der aktuellen Existenz ihres Gegenstandes völlig ab und richtet sich nur auf dessen wesent-

corrumpatur quantum ad esse actualis existentiae, si tamen maneat quantum ad esse essentiae, potest manere inherentia passionis ad subiectum et, per consequens, scientia. Etiam manet definitio, quia definitio indicat esse essentiale rei. Et definitio est medium in demonstratione, et sic manet tota demonstratio, quia manet medium et conclusio. Sed demonstratio facit scientiam; quare manet scientia."

13. In Siger de Brabant, *Écrits de logique, de morale et de physique* (Bazán), p. 54.
14. In Grabmann, *Die Sophismataliteratur*, p. 79.
15. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. 3$^{rb}$: "Sed hoc improbatur, quia res secundum esse actuale habet particulare esse, sed ⟨secundum⟩ esse essentiae habet esse universale. Universalia autem, licet non corrumpantur per se, tamen corrumpuntur per accidens; corrupto enim Sorte, corrumpitur homo qui est in Sorte. Ideo dicitur in *Praedicamentis* quod, destructis primis, impossibile est aliquid aliorum remanere. Corrupta ergo re quantum ad esse actuale, corrumpitur quantum ad esse essentiae."
16. Z.B. von Bartholomaeus de Brugis; cf. *Quaestiones super De generatione et corruptione*, MS Leipzig, Universitätsbibliothek, 1427, fol. 17$^{vb}$ (zu diesem Werk cf. *infra*, pp. 115-119): " ... Essentia rei non habet esse nisi in particularibus actualiter existentibus; et hoc est quod dicitur in *Praedicamentis*, quod, corruptis primis, impossibile est aliquod aliorum remanere, vel rediret opinio Platonis, scilicet quod quidditate⟨s⟩ rerum essentiae (*pro*: essent) separatae ... "

liche Bestimmungen.[17] Diesen Gedanken faßt Aegidius in seinem späteren Kommentar zu den *Analytica posteriora* dahingehend zusammen, daß die aktuelle Existenz hinsichtlich der Erkenntnis nur nebensächlich ist.[18] Demgemäß läßt sich die Frage nach dem Wahrheitsgrund der Wissenschaft auch bei Aegidius gänzlich auf die Frage zurückführen, inwiefern die Wesenheit von der aktuellen Existenz in ihren konkreten Trägern unabhängig ist. Andererseits versucht Aegidius diese Frage ohne Rekurs auf den Gedanken einer der Wesenheit eigenen Seinsschicht zu beantworten. So unterscheidet sich seine Position im Grunde von der genannten Meinung dadurch, daß er den Begriff eines Seins zurückweist, welches der Wesenheit eigentümlich und von der konkreten Existenz unabhängig wäre.

Kernstück der Lehre des Aegidius ist eine Unterscheidung, die von späteren Autoren als die Dreiteilung des *esse* referiert wird. Etwas — so Aegidius — kann auf drei verschiedene Weisen existieren, nämlich in sich, in den Ursachen und im erkennenden Verstand.[19] *Esse* eines Dinges in sich und *esse* in den Ursachen stellen zwei Arten des realen Seins dar: das erste ein aktuelles Sein, das zweite hingegen nur ein potentielles Sein. Mit dem Begriff des *esse* des Dinges in sich selbst ist nämlich die aktuelle Existenz des Individuums gemeint. Unter dem Begriff des *esse* in den Ursachen versteht man dagegen jene Art des Seins, das einem jeden Ding dann zugesprochen werden kann, wenn die Ursachen existieren, die es zu bewirken vermögen, denn wenn die Ursachen bestehen, die eine Wirkung ins Sein hervorrufen können, ist die Wirkung selbst "in potentia ad esse." Somit spricht man von einem *esse* des Effekts "in suis causis," was offensichtlich als eine Existenz im weiten Sinne und als ein potentielles Sein aufzufassen ist.[20] Im Gegensatz zu diesen beiden Arten des extramentalen Seins bezeichnet das *esse in anima* bloß ein Gedachtsein, welches das absolute Minimum an Seiendheit bildet.

Angelpunkt dieser Auffassung ist nun der Begriff der potentiellen Existenz in den Ursachen, denn ein *figmentum* wie die Chimäre oder der Bockshirsch besitzt nur ein mentales Sein; es handelt sich allein um ein Gedankending, das nicht in der Wirklichkeit begründet ist. Im Vergleich zu diesem reinen Gedachtsein impliziert das potentielle Sein in den Ursachen einen höheren Grad an Wirklichkeit, denn dabei gehen wir in die Sphäre des extramentalen Seins über, wenn auch nur des potentiellen. Die Existenz in den Ursachen zieht also die Grenze

17. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{va}$.
18. Aegidius Romanus, *Super libros Posteriorum analyticorum* (Venezia, 1488), fol. $b^{6ra}$. Zur Datierung dieses Werks, das ungefähr auf die Jahre 1287 – 1295 zurückgeht, cf. Donati, "Studi," Teil I, pp. 55-65.
19. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{va}$: "Ad cuius evidentiam notandum quod res habent tripliciter esse: in se ipsis, in suis causis et apud intellectum ... "
20. *Ibid.*: "Res ergo ... , eo ipso quod sunt in causis, sunt in potentia ad esse ... "

zwischen dem Bereich des reinen Denkens und dem Bereich der Wirklichkeit.[21] Infolgedessen bildet das *esse* in den Ursachen nach Ansicht des Aegidius ein hinreichendes ontologisches Fundament dafür, daß man von einer Wesenheit und von einem Realbegriff spricht. Zur Bestätigung dieser These beruft sich Aegidius auf sein Verständnis der Wesenheit als einer Potentialität zur aktuellen Existenz. Weil die Potentialität zum aktuellen Sein den eigentlichen Charakter der Wesenheit ausmacht, so genügt nach Meinung des Augustiner-Magisters das potentielle Sein in den Ursachen als deren konstitutives Moment.[22]

Daraus folgt, daß das *esse in suis causis* ebenfalls als hinreichende ontologische Grundlage der Wissenschaft anzusehen ist. Bei der Begründung dieses Schlusses stützt sich Aegidius auf zwei verschiedene Überlegungen. Zunächst wird betont, daß die wissenschaftliche Erkenntnis in einer Erkenntnis durch die Ursachen besteht. Demgemäß ergibt sich aus der Kenntnis der Ursachen eine gewisse Kenntnis des Effekts selbst. Daneben wird aber noch eine zweite Erklärung angeführt, die an die oben dargestellten metaphysischen Erwägungen anknüpft: Weil die Wesenheit der eigentliche Gegenstand der Wissenschaft ist, und andererseits dem, was in den Ursachen potentiell existiert, gewissermaßen eine Wesenheit zukommt, so kann es von einer Wissenschaft betrachtet werden.[23] Wie die folgende Analyse zeigen wird, werden beide Erläuterungen das Bedenken der späteren Autoren hervorrufen. Zum einen wird man einwenden, daß die lediglich durch die Ursachen erworbene Erkenntnis eines Dinges keine Erkenntnis des Dinges an sich und *sub propria ratione* ist, zum anderen, daß das nur potentiell Existierende keinen adäquaten Gegenstand des Erkennens darstellt. Aegidius seinerseits scheint jedoch keinen Zweifel angesichts dieser Lösung zu hegen, denn bei der Wiederaufnahme der Frage nach dem ontologischen Fundament der Wissenschaft im späteren Kommentar zu den *Analytica posteriora* wird der Gedanke des *esse* in den Ursachen der Kernbegriff bleiben.[24]

Anhand des Begriffes des Seins in den Ursachen erläutert nun der Augustiner-Magister die Bedingungen, die von Aristoteles für den adäquaten Gegenstand einer Wissenschaft aufgestellt worden waren. Er stimmt nämlich zu, daß eine Wissenschaft die Existenz ihres Gegenstandes voraussetzen muß; die potentielle Existenz in den Ursachen sei jedoch ausreichend. Er stimmt zweitens zu, daß das Nichtseiende nur durch eine Nominaldefinition erfaßt werden

21. *Ibid.*: " ... Hoc tripliciter esse se habet per ordinem, quia quicquid habet esse actuale et in se ipso habet esse in suis causis, sed non convertitur; multa enim sunt in suis causis quae in se ipsis actualiter non existunt. Sic quicquid habet esse actuale ⟨vel⟩ in suis causis habet esse rationis et apud intellectum, sed non convertitur; chimaera enim est quid apud animam et tamen non est aliquid in se nec in suis causis."
22. *Ibid.*: " ... Existentia rei in suis causis facit ut de re possit esse scientia non solum ut per cognitionem causae cognoscitur effectus, sed quoniam sufficit ad rationem quidditatis quod sit in potentia ad esse."
23. Cf. *ibid.* in der vorangehenden Anm.
24. Aegidius Romanus, *Super libros Posteriorum analyticorum* (Venezia, 1488). I, fols. $b^{6ra}$, $e^{6rb}$-$e^{6va}$; II, fols. $n^{1rb}$-$n^{1va}$.

kann und nicht durch eine Wesensdefinition; es handle sich aber dabei um das, was weder in sich noch in den Ursachen existiert.[25]

Im Licht dieser Theorie kann jetzt die anfängliche Frage nach dem Wahrheitsgrund der Naturwissenschaften beantwortet werden. Nachdem Naturdinge wie die Rose oder natürliche Ereignisse wie der Regen vergangen sind, bleiben dennoch die Ursachen bestehen, durch die sie wieder bewirkt werden können. Demgemäß wird der Begriff der Rose oder des Regens nicht zu einem reinen *figmentum* des Verstandes, sondern man spricht immer noch von einer Wesenheit, welche den objektiven Charakter eines Gegenstandes wissenschaftlicher Erkenntnis aufweist.[26] Um den Unterschied zwischen der Auffassung des Aegidius Romanus und der ersten essentialischen Lösung deutlich zu machen, ist jetzt noch folgendes zu bemerken. Jene Meinung besagte, nach dem Vergehen gemäß dem *esse actuale* bleibe das Ding gemäß seinem *esse essentiae* gewahrt. Aegidius weist ausdrücklich die Annahme zurück, etwas könne fortbestehen, nachdem das Ding gemäß dem *esse actuale* vergangen ist. Im eigentlichen Sinn — so Aegidius — bleibt ein Ding nur solange erhalten, als es in sich existiert. In einem übertragenen Sinne kann jedoch auch die Lehre vom *esse essentiae* aufrecht erhalten werden, nämlich als eine abgekürzte und unpräzise Beschreibung eines komplizierteren Sachverhaltes. Fortbestehen gemäß dem *esse essentiae* soll in dem Sinne verstanden werden, daß etwas gemäß seinen wesentlichen Bestimmungen noch weiter erkennbar ist, was aber schon durch die potentielle Existenz in den Ursachen hinreichend verbürgt wird.[27] Die traditionellen Begriffe des *esse essentiae*, des *esse quidditativum*

25. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{vb}$.

26. *Ibid.*, fol. $3^{va-vb}$: " ... Si res corrumperetur ita quod nec remaneret in se nec in suis causis, sed solum esset ens apud animam, non remaneret scientia rei; si enim corrumperetur pluvia in se et in suis causis, et solum esset ens apud animam et non esset plus ens quam chimaera, de pluvia scientia esse non posset. Tamen, quia corruptibilia ista numquam sic corrumpuntur quin remaneant in suis causis ... dicamus scientiam talium remanere eis corruptis." Zur Geschichte der Lehre vom *esse in suis causis* sei noch hinzugefügt, daß Ansätze dieser Lösung schon bei früheren Autoren vorkommen. Ein Beispiel findet sich im Kommentar Alberts des Großen zu den *Analytica posteriora*. Bei der Behandlung der Frage, ob auch Nichtseiende adäquate Gegenstände einer Wissenschaft oder einer Definition bilden können, unterscheidet er zwei Arten von Nichtseienden, und zwar die *impossibilia*, die weder in sich noch in ihren Prinzipien existieren, und die *possibilia*, die hingegen in ihren Ursachen und Prinzipien enthalten sind. Nun stellen die *impossibilia* keinen adäquaten Gegenstand der Erkenntnis dar. Was dagegen wenigstens in den Ursachen existiert, wie z.B. die zukünftige Mondfisternis, kann erkannt und definiert werden. Dazu cf. Albertus Magnus, *Super libros Posteriorum analyticorum* (Borgnet), II, tract. 2, cap. 6, pp. 181-182. Zu Alberts Auffassung cf. jedoch auch De Libera, "Logique et existence," besonders pp. 551-557. Ein anderes Beispiel findet sich in Robert Grossetestes Kommentar zu den *Analytica posteriora*; dazu cf. *infra*.

27. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{va}$: " ... Proprie ergo loquendo non remanet res nisi ut est aliquid in se ipsa. Sed si dicentes res remanere secundum esse essentiae, cum corrumpuntur secundum esse actuale, sed permanere rem (sed ... rem *fortasse pro*: si per manere rerum) secundum esse essentiae intelligere vellent existentiam earum in suis causis, secundum quam competit rebus ut sint

und des *esse praedicamentale*, welche auch im Kommentar des Aegidius zu den *Analytica posteriora* wiederkehren, bezeichnen demgemäß keine Art des realen Seins, das der Wesenheit an sich eigen wäre. Sie weisen vielmehr auf das Verhältnis eines Dinges zum erkennenden Verstand hin: Sie bringen die Tatsache zum Ausdruck, daß etwas einen adäquaten Gegenstand des Erkennens darstellt. Weil sich der Verstand nur auf die Wesenheit richtet, benutzt man die Ausdrücke "esse essentiae" oder "esse quidditativum" oder auch "esse praedicamentale." Hinreichende ontologische Grundlage dafür ist aber, wie gesagt, die potentielle Existenz in den Ursachen.[28]

## Post-Aegidianische Kommentare zur Schrift *De generatione et corruptione*

### *Aegidius von Orléans: die* scientia ex suppositione

Als ersten der post-aegidianischen Kommentare zur Schrift *De generatione* wollen wir jetzt die Quästionen des Pariser Magisters Aegidius von Orléans heranziehen, der gegen Ende des 13. Jahrhunderts an der Artistenfakultät tätig war. Bekanntlich wird dieses Werk in mehreren Handschriften überliefert, und — wie es scheint — in zwei verschiedenen Fassungen, die wir in der folgenden Analyse auseinanderhalten werden.[29]

Aegidius von Orléans ist einer der Kritiker der Theorie des *esse* in den Ursachen. Er diskutiert mehrere Auffassungen, unter denen auch die Lehre vom *esse essentiae* und die Lehre vom *esse in suis causis* vorkommen. Die erste Meinung wird wie bereits von Aegidius Romanus als metaphysisch unvertretbar zurückgewiesen.[30] Die Lösung des Augustiner-Magisters wird ebenfalls abgelehnt, aber aus erkenntnistheoretischen Gründen. Kernstück dieser Auffassung war, wie gesagt, der Gedanke, etwas könne als ein adäquater Gegenstand der Wissenschaft betrachtet werden, solange es wenigstens in den Ursachen existiere. Gerade dieser Gedanke wird von Aegidius von Orléans kritisiert. Was allein in den Ursachen existiert — so unserer Magister — besteht nur potentiell, d.h.: Es gibt in der Tat keine Wesenheit, die als Grundlage der Erkenntnis fungieren kann. In dieser Hinsicht wird dem, was nur potentiell in den Ursachen

obiectum intellectus et ut possunt intelligi secundum suam quidditatem, bonum intellectum haberent; ideo improprie loquerentur."

28. Aegidius Romanus, *Super libros Posteriorum analyticorum* (Venezia, 1488), I, fols. $b^{6ra}$, $e^{6rb}$-$6^{6va}$; II, $n^{1rb}$-$n^{1va}$.

29. Eine der beiden Fassungen (im folgenden Fassung B) ist von Z. Kuksewicz ediert worden; cf. Aegidius Aurelianensis, *Quaestiones super De generatione et corruptione* (Kuksewicz). Für die andere Fassung (im folgenden Fassung A) beziehe ich mich auf das MS Firenze, Biblioteca Nazionale Centrale, Conv. Soppr. E.1. 252, fols. $141^{ra}$-$159^{rb}$. Zur handschriftlichen Überlieferung der Quästionen zur Schrift *De generatione* cf. neben der kurzen Einführung von Kuksewicz (*op. cit.*, pp. V-XXIII) auch Donati, "Das Problem," pp. 399-400, Anm. 45 und die dabei angeführte Literatur, sowie Flüeler, "Rezension von: Aegidius Aurelianensis." Zu einigen Aspekten des naturphilosophischen Denkens des Aegidius von Orléans cf. Kuksewicz, "Gilles d'Orléans."

30. Aegidius Aurelianensis, Fassung A, *MS cit.*, fol. $142^{rb-va}$; Fassung B, *ed. cit.*, pp. $9^{22}$-$10^{7}$.

existiert, kein höherer Grad an Erkennbarkeit beigemessen als den reinen *figmenta*; in beiden Fällen ist lediglich eine Nominaldefinition möglich. Adäquater Gegenstand des Erkennens im eigentlichen Sinne — so schließt er — ist nur, was aktuell existiert.[31]

Ganz im Rahmen derselben Überlegungen bewegt sich auch seine Kritik an einer dritten Lösung, die uns noch nicht begegnet ist. Nach dieser Lösung kann durch eine Wesensdefinition auch das erfaßt werden, was zwar in der Gegenwart keine aktuelle Existenz besitzt, was aber in der Vergangenheit existierte und in der Zukunft wieder bestehen wird. Diese Erklärung — so lautet der Einwand des Aegidius von Orléans — trägt nichts zur Lösung der Frage nach dem Fundament der Erkenntnis bei, denn es reicht nicht, daß der Gegenstand einer Wissenschaft irgendwann existierte oder existieren wird. Es ist auch notwendig, daß er aktuell eine Wesenheit besitzt, was jedoch keinem nicht aktuell Existierenden zukommt.[32]

Ausgangspunkt dieser scharfen Stellungnahme ist ein Wahrheitskriterium, das sich strikt an der faktischen Wahrheit orientiert. Was ist an der wissenschaftlichen Erkenntnis wesentlich? — fragt sich der Autor. *Scientia* — so lautet seine Antwort — ist ein *habitus semper verus*; Wesensmerkmal der Wissenschaft ist deshalb ihre Wahrhaftigkeit. Nun besteht die Wahrheit in einer Übereinstimmung zwischen Denken und Wirklichkeit. Nachdem aber der Gegenstand der Erkenntnis vergangen ist, gibt es auch keine Wahrheit mehr, obwohl die Denkinhalte im Verstand erhalten bleiben, denn bei der genannten Relation des Verstandes zur Wirklichkeit fehlt unter diesen Umständen der extramentale Bezugspunkt, nämlich die Wirklichkeit.[33] Aus diesen Prämissen

31. Aegidius Aurelianensis, Fassung B, *ed. cit.*, p. $10^{8-24}$: "Secunda opinio similiter non valet, nec est sufficiens. Cum dicitur, quod, si aliquid corrumpitur in se et remanet in suis causis, quod de ipso sit scientia, probo, quod non. Quia remanere in suis causis est remanere solum virtute et potentialiter et non actu. Quod autem non est actu, non habet essentiam; de tali autem, quod non habet essentiam, non contingit sciri, quid est res, sed solum, quid dicitur per nomen. Ergo illud, quod remanet in suis causis, est tale, quod de ipso solum scitur, quid est nominis; sed de tali non est scientia, ut prius dictum est. Ergo tale, quod sic remanet, non potest esse scibile, nec de ipso erit scientia ... Ad hoc, quod aliquid sit scibile simpliciter, oportet, quod (*pro*: et?) requiritur, quod sit actu." In der Fassung A findet sich folgende Formulierung: Was nur in den Ursachen existiert, besteht nur *secundum quid*; folglich kann es nur *secundum quid* erkannt werden; dazu cf. *MS cit.*, fol. $142^{va}$.

32. Aegidius Aurelianensis, Fassung B, *ed. cit.*, p. $10^{24-31}$ (die hier angewandte Interpunktion weicht gelegentlich von der Interpunktion der Edition ab): "Nec valet illud, quod dicunt aliqui, quod de eo, quod non est, non contingit scire, quid sit, id est de illo, quod numquam fuit nec est nec erit; sed de isto, quod non est et fuit aliquando et etiam erit aliquando, bene contingit scire, quid sit. Ut dicunt isti, istud nihil est dictum: Quid enim valet ad hoc, quod de rebus sit scientia simpliciter, quod aliquando fiunt? Hoc non sufficit; immo requiritur, quod habeant essentiam actu et definitionem essentialem. Ideo haec opinio nulla est."

33. *Ibid.*, p. $11^{12-20}$: " ... Scientia est habitus semper verus, quem semper veritas consequitur. Sed ad veritatem requiritur conformitas rationis seu conceptus ad ipsam rem; ergo ad scientiam requiritur talis conformitas rationis ad rem; et hoc est formale in scientia. Sed rebus corruptis talis conformitas non potest esse; ergo rebus corruptis non potest esse scientia, sed corrumpitur.

schließt Aegidius von Orléans ganz konsequent, daß beim Vergehen des Gegenstandes eine wissenschaftliche Erkenntnis im eigentlichen Sinne nicht gewahrt bleibt. Handelt es sich aber um derartige Dinge, die wieder hervorgebracht werden können, so räumt er die Möglichkeit einer Erkenntnis im sekundären Sinne ein, welche gewöhnlich durch die gleichbedeutenden Ausdrücke "scientia ex suppositione," "scientia ex condicione" oder "scientia sub condicione" bezeichnet wird.[34]

Äußeres Merkmal der *scientia ex suppositione*, wie in einer der beiden Fassungen betont wird, ist ihre sprachliche Form: Im Gegensatz zur *scientia simpliciter*, die sich in kategorischen Sätzen ausdrückt, ist diese zweite Art der Wissenschaft durch die Anwendung von Konditionalsätzen gekennzeichnet. Grund dafür ist die Tatsache, daß die Wahrheit eines Konditionalsatzes von der Existenz der bezeichneten Dinge unabhängig ist, so daß er auch im Fall eines nicht aktuell existierenden Gegenstandes seinen Wahrheitswert behalten kann.

Dieser Gedanke ist in der Geschichte der Diskussionen über den Wahrheitsgrund der Erkenntnis nicht neu. Ähnliche Überlegungen finden sich z.B. bereits bei Robert Grosseteste. Wenigstens innerhalb der englischen Tradition scheint die Lehre von der Wissenschaft "sub condicione" sogar ausdrücklich mit dem Namen Grossetestes verknüpft zu werden.[35] In seinem Kommentar zu *Anal. Post.* I, 8, wo er das Problem der Unvergänglichkeit des Gegenstandes des Erkennens betrachtet, berücksichtigt Grosseteste auch das klassische Beispiel der Mondfinsternis.[36] Er bezieht sich dabei auf eine Passage des Textes, die in diesem Zusammenhang häufig zitiert wird. Gemäß der durchgängigen mittelalterlichen Auslegung sagt Aristoteles an dieser Stelle zweierlei: erstens, daß Phänomene wie die Mondfinsternis in einer gewissen Hinsicht immer existieren, und zweitens, daß sie nur dank dieser Art der Unvergänglichkeit als Gegenstand der Erkenntnis fungieren können.[37] Grosseteste schlägt zwei Interpretationen

Et sic patet, quod ad hoc, quod de aliquo sit scientia, non sufficit, quod de illo habeatur una ratio seu conceptus, sed plus requiritur, scilicet conformitas rationis ad rem." Derselbe Gedankengang kommt auch in der Fassung A vor; dazu cf. *MS cit.*, fol. 142$^{vb}$. Ähnliche Überlegungen finden sich z.B. schon bei Boethius von Dacien in seinem Sophisma: "Omnis homo de necessitate est animal" (in Grabmann, *Die Sophismataliteratur*, pp. 85-86).

34. Aegidius Aurelianensis, Fassung B, *ed. cit.*, p. 11$^{21-24}$: "Dicendum tamen, quod, si aliquid corrumpatur quantum ad esse sui specificum et possit redire secundum suum esse specificum, sicut eclipsis et pluvia etc., his corruptis potest esse scientia ex suppositione, et hoc per condicionales propositiones ... "

35. Das ergibt sich z.B. aus einer Marginalie, die sich in den Quästionen des englischen Magisters Wilhelm von Bonkes zur Schrift *De generatione* (dazu cf. *infra*, pp. 119-122) an der Stelle findet, an der der Autor über die Wissenschaft *sub condicione* referiert (MS Cambridge, Gonville and Caius College, 344, fol. 93$^{va}$). In dieser Marginalie wird die Lehre von der Wissenschaft "sub condicione" als "positio Lincolniensis" bezeichnet.

36. Robertus Grosseteste, *Commentarius in Posteriorum Analyticorum libros* (Rossi), I, 7, pp. 143$^{189}$-145$^{219}$. Zur Auslegung dieser Stelle cf. Wallace, *Causality and Scientific Explanation*, I, besonders pp. 31-33; Marrone, *William of Auvergne*, besonders pp. 232-245. Zu Robert Grossetestes Lehre cf. aber auch Rossi, "Robert Grosseteste."

37. Aristoteles, *Analytica posteriora*, I, 8, 75b33-36. Zur Anwendung dieser Stelle und ihrer

vor. Die erste, die gewissermaßen die aegidianische Theorie des *esse* in den Ursachen vorwegnimmt, besagt, daß die Mondfinsternis immer "in rationibus suis causalibus" existiert. Die zweite ist viel subtiler: Aristoteles schreibe der Finsternis nicht eine unvergängliche Existenz zu, er meine nur, daß hinsichtlich der Finsternis Beweise geführt werden können, deren Wahrheit unvergänglich ist. Nun geschieht dies nach Grossetestes Ansicht, wenn der Syllogismus aus Konditionalsätzen besteht.[38]

Im Umkreis derselben Gedanken bewegt sich die Lösung des Aegidius von Orléans, denn auch bei ihm findet man den Übergang von einer metaphysischen zu einer logischen Perspektive. Es handelt sich nämlich nicht um die Frage eines gewissermaßen unvergänglichen Gegenstandes, der die Wahrheit von Aussagen über nicht aktuell existierende Dinge verbürgen kann; es geht eher um die Frage, welcher Art die Aussagen sind, deren Wahrheit die Existenz der von ihr bezeichneten Gegenstände nicht voraussetzt. Nun kommt diese Eigenschaft auch nach Ansicht des Aegidius den Konditionalsätzen zu. Dies erklärt sich durch eine Analyse der Wahrheitsbedingungen dieser Art von Aussagen, denn ein Konditionalsatz kann auch dann wahr sein, wenn sowohl der Vordersatz als auch der Folgesatz falsch sind. Eine Aussage wie diejenige: "Wenn die Erde sich *diametraliter* zwischen den Mond und die Sonne schiebt, kommt es zur Mondfinsternis," bleibt daher auch dann wahr — so Aegidius von Orléans — wenn das Phänomen der Mondfinsternis aufgehört hat.[39]

Interpretation bei mittelalterlichen Kommentatoren cf. auch die in Anm. 45, 47, 48 zitierten Texte. Die korrekte Interpretation der aristotelischen Passage scheint aber etwas anders zu sein: Von den Phänomenen, "quae saepe fiunt," wie z.B. der Mondfinsternis, können insofern Beweise formuliert werden, deren Wahrheit ewig ist, als solche Ereignisse als Universalien und nicht als Individuen betrachtet werden. Dazu cf. Aristotle, *Prior and Posterior Analytics* (Ross), p. 533; Aristotle, *Posterior Analytics* (Barnes), p. 134.

38. Robertus Grosseteste, *Commentarius in Posteriorum Analyticorum libros* (Rossi). I, 7, p. $144^{194-211}$: "Et solvit Aristoteles hoc dicens: manifestum est quod in quantum hec sunt recipientia supra se demonstrationem semper sunt. Sed intellectus horum verborum Aristotelis non est satis manifestus, quia, ut predictum est, eclipsis non est in omni hora, nisi dicamus eam esse semper quia ipsa est semper in rationibus suis causalibus ... Aut enim sic dicendum est aut quod Aristoteles non intendebat dicere quod eclipsis semper est, sed intendebat dicere quod conclusio in qua demonstratur eclipsis est propositio habens veritatem in omni hora sive eclipsis sit sive non sit. Verbi gratia, si sic sillogizatur: quotienscumque luna cadit in umbram terre, luna eclipsatur, et quotienscumque luna opponitur soli per diametrum habens minorem latitudinem quam sit quantitas duorum semidiametrorum lune, scilicet, et umbre, luna cadit in umbram, ergo quotienscumque luna opponitur soli per diametrum habens minorem latitudinem quam sit quantitas duorum semidiametrorum lune, scilicet, et umbre, luna eclipsatur, quelibet istarum propositionum in omni tempore est vera."

39. Aegidius Aurelianensis, Fassung B, *ed. cit.*, p. $11^{27}$-$12^{5}$: "Unde bene potest esse aliqua condicionalis tota vera, et tamen antecedens falsum est simpliciter, consequens similiter, sicut ista est vera — ut, si asinus volat, asinus habet alas — ... Similiter in proposito: Si terra interponatur inter lunam etc., tota vera est, et tamen antecedens falsum est, scilicet quod si terra interponatur (si ... interponatur *fortasse pro*: terra sit interposita) inter solem et lunam; et luna eclipsatur, similiter falsa eclipsi exeunte (*fortasse pro*: existente) corrupta, sed tota condicionalis est vera. Et per tales condicionales propositiones potest scientia haberi de his, quae

In der anderen Fassung der Quästionen des Aegidius von Orléans zur Schrift *De generatione* findet sich eine etwas abweichende Formulierung, und es ist nicht ganz klar, ob sie als eine Alternative zur ersten oder nur als eine Ergänzung zu betrachten ist. Gemäß dieser Formulierung, die allerdings bereits Aegidius Romanus bekannt war,[40] sind die kategorischen Aussagen von einem nicht aktuell existierenden Subjekt *condicionaliter* wahr; sie wären nämlich wahr, vorausgesetzt, daß ihr Subjekt existierte. Vom nicht aktuell existierenden Regen z.B. bleibt insofern eine Erkenntnis *ex suppositione* erhalten, als die Aussagen vom Regen wahr wären, falls es jetzt regnete.[41] Wie auch die folgende Analyse zeigen wird, richtet sich die Kritik der Gegner der Lehre von der *scientia ex suppositione* besonders gegen diese zweite Formulierung, denn in diesem Fall scheint ein Einwand völlig berechtigt, der schon von Aegidius Romanus erhoben wurde: Falls die wissenschaftlichen Aussagen nur *condicionaliter* wahr wären, dann wären sie falsch, wenn ihre Voraussetzung entfiele — was offenbar den allgemeinen Vorstellungen über die Natur der Wissenschaft widerspricht.[42]

Was nun die ontologische Grundlage der Lehre von der *scientia ex suppositione* betrifft, so gründet eine solche Theorie in der Notwendigkeit der ursächlichen Beziehung, so daß die *scientia ex suppositione* auch als *scientia ex suppositione causarum* beschrieben wird. Bei diesen Überlegungen, die bereits bei Autoren wie Thomas von Aquin oder Boethius von Dacien vorkommen, beruft man sich gewöhnlich auf die Stelle in *Anal. Post.* I, 8, die in bezug auf Grossetestes Kommentar erwähnt wurde.[43] Nach diesen Autoren schreibt hier Aristoteles, wie gesagt, den Phänomenen, "quae saepe fiunt," beispielsweise der Finsternis, eine Art der Unvergänglichkeit zu, welche die notwendige Bedingung für ihre Erkennbarkeit darstellt. Das ist jedoch nicht im absoluten Sinne und für alle Zeiten zu verstehen, sondern — so interpretiert z.B. Thomas von Aquin in seinem Kommentar zu den *Analytica posteriora* — "per com-

sunt corrupta secundum esse specificum, et iterum possunt redire secundum esse specificum." Eine Auffassung, welche der Position des Aegidius von Orléans sehr ähnlich ist, wird von dem Autor der Quästionen zur Schrift *De generatione* vertreten, die im MS Firenze, Biblioteca Medicea Laurenziana, Fiesol. 161 (fols. $57^{ra}$-$66^{vb}$) enthalten sind; dazu cf. Donati, *Das Problem*, pp. 399-404.

40. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{rb}$.

41. Aegidius Aurelianensis, Fassung A, *MS cit.*, fol. $142^{va}$: "Ideo dico quod, re corrupta, potest manere scientia eius non simpliciter, sed sub condicione, sicut de pluvia quae modo non est manet scientia ex condicione, sicut quod, si pluvia esset modo, vera essent illa quae profero de ea, sicut quod est aqua guttatim cadens, non tota simul, et quod habet esse per condensationem nubis, et sic de aliis quae possunt verificari de pluvia ... "

42. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. $3^{rb}$: "Sed hoc improbari potest, quia, cum aliquid non est aliter verum nisi sub condicione, non stante condicione, non stat veritas eius; si ergo, re non existente, non habetur scientia nisi sub condicione, utputa si res esset, cum ipsa res ponatur non existere, verum erit dicere quod non est scientia rei quamdiu res non existit ... " Dazu cf. auch *infra*, p. 123

43. Aristoteles, *Analytica posteriora*, I, 8, 75b33-36.

parationem ad causam."[44] Boethius von Dacien[45] und Aegidius von Orléans[46] benutzen die Ausdrücke "ex suppositione principiorum" und "ex suppositione causarum." Thomas' Erläuterung macht deutlich, wie solche Ausdrücke zu verstehen sind: Der Finsternis kann eine Unvergänglichkeit in bezug auf die Ursachen deshalb zugesprochen werden, weil es notwendigerweise zur Finsternis kommt, vorausgesetzt, daß die Ursachen bestehen und nicht behindert werden.[47] Hinsichtlich dieser Art der Unvergänglichkeit kann ein derartiges Phänomen als adäquater Gegenstand der Erkenntnis angesehen werden. Demgemäß — das ist der Schluß des Aegidius von Orléans — spricht man bei solchen Ereignissen von einer *scientia ex suppositione causarum.*[48] Es handelt sich aber offenbar nur um eine Unvergänglichkeit im übertragenen Sinne, nämlich um die notwendige Abhängigkeit eines Effekts von seinen Ursachen. Und das, worauf man damit hinauswill, ist der Gedanke, daß bei den Phänomenen, "quae saepe fiunt," lediglich solche notwendigen Verhältnisse unter die Betrachtung einer Wissenschaft geraten. Konkreter gesagt bringen die Konditionalsätze, die in einer *scientia ex suppositione* benutzt werden, ursächliche Beziehungen zum Ausdruck, so daß ihre Notwendigkeit in der notwendigen Abhängigkeit der Wirkungen von deren Ursachen begründet ist.

*Bartholomaeus von Brügge: eine Kompromißlösung*

Als zweites Werk ziehen wir die Quästionen des Bartholomaeus von Brügge, eines Pariser Magisters aus dem Anfang des 14. Jahrhunderts, heran.[49] Bei

44. Cf. Thomas Aquinas, *Expositio libri posteriorum* (Gauthier), I, cap. 16, Roma-Paris, 1989, p. $62^{122\text{-}139}$.
45. Cf. z.B. Boethius Dacus, *Modi significandi sive Quaestiones super Priscianum Maiorem* (Pinborg e.a.), p. $18^{56\text{-}62}$. Zur Auffassung des Boethius von Dacien cf. Pinborg, "Zur Philosophie des Boethius de Dacia."
46. Aegidius Aurelianensis, Fassung A, *MS cit.*, fol. $142^{va\text{-}vb}$.
47. Cf. Thomas Aquinas, *Expositio libri posteriorum* (Gauthier), I, cap. 16, Roma-Paris, 1989, p. $62^{122\text{-}139}$: " ... Hec autem que sunt frequenter secundum quod huiusmodi sunt, id est secundum quod de eis demonstrationes dantur, sunt semper ... Quedam enim non sunt semper secundum tempus quidem, sunt autem semper per comparationem ad causam, quia nunquam deficit quin, posita tali causa, sequatur effectus, sicut est de defectu lune: nunquam enim deficit quin semper sit lune eclipsis quandocunque terra dyametraliter interponitur inter solem et lunam." Zur Auffassung des Thomas von Aquin cf. auch Wallace, *Causality and Scientific Explanation*, I, pp. 74-75; id., "Aquinas."
48. Aegidius Aurelianensis, Fassung A, *MS cit.*, fol. $142^{va\text{-}vb}$: "Unde Philosophus dicit, I *Posteriorum*, quod de illis quae saepe fiunt est scientia non ut saepe sunt, sed ut semper sunt, id est in comparatione ad suas causas non impeditas. Unde ex suppositione suarum causarum non impeditarum est scientia de ipsis; et sic ex suppositione." Eine ähnliche Auffassung findet sich auch in den Quästionen zu den *Analytica posteriora* des Pariser Magisters Jakob von Douai, der im letzten Viertel des 13. Jahrhunderts der Artistenfakultät angehörte; dazu cf. die von Pinborg ("Zur Philosophie des Boethius de Dacia," p. 174, Anm. 21) publizierten Exzerpte. Zur Persöhnlichkeit Jakobs von Douai cf. Grabmann, "Jakob von Douai."
49. Zu Bartholomaeus von Brügge und seinen Werken cf. Pelzer, "Barthélemy de Bruges"; Pattin, "Bartholomaeus van Brugge"; Pattin, *Pour l'histoire du sens agent*, p. 32.

seiner Behandlung der Frage: "De rebus corruptis utrum possit esse scientia,"[50] referiert er verschiedene Lösungsversuche und die Einwände, die jeweils gegen sie erhoben werden. Neben den drei bisher von uns betrachteten Theorien, nämlich der Lehre vom *esse essentiae*, der Lehre vom *esse in suis causis* und der Lehre von der *scientia ex suppositione*, erwähnt Bartholomaeus eine vierte, die sich dennoch von der dritten nicht allzu sehr unterscheidet. Gemeinsamer Ausgangspunkt der dritten und der vierten Lösung ist ihre logische Perspektive. Es geht auch dabei um die Frage, welche Art von Sätzen die Existenz des Subjekts unter ihren Wahrheitsbedingungen nicht voraussetzt. Hier fällt aber die Wahl nicht auf Konditionalsätze, sondern auf Aussagen *de possibili*, die genauso wie die konditionalen Aussagen im Fall eines nicht aktuell existierenden Subjekts noch wahr sein können. Wenn der Gegenstand der Wissenschaft einmal vergangen ist, dann bleibt gemäß dieser vierten Lösung eine Art der Erkenntnis, die durch Möglichkeitsaussagen ausgedrückt wird.[51] Der Name des Vertreters dieser Theorie wird nicht erwähnt. Man könnte jedoch vielleicht an einen Autor wie den Pariser Magister Radulphus Brito denken, der in den Jahren um 1300 der Artistenfakultät angehörte, denn in seinen Quästionen zu den *Meteora* räumt er die Möglichkeit einer Wissenschaft von meteorologischen Ereignissen ein, welche nicht besagt, daß diese Ereignisse existieren, sondern lediglich, daß sie in der Vergangenheit existierten und daß sie existieren können.[52]

Was die Argumente gegen diese verschiedenen Theorien betrifft, so wird die These des Fortbestehens gemäß dem *esse essentiae* auch von Bartholomaeus

50. Die Quästionen des Bartholomaeus von Brügge zur Schrift *De generatione* werden vom MS Leipzig, Universitätsbibliothek, 1427, fols. $17^{ra}$-$22^{vb}$ überliefert. Für die betreffende Quästio cf. fols. $17^{va}$-$18^{ra}$.

51. Bartholomaeus de Brugis, *Quaestiones super De generatione et corruptione*, MS Leipzig, Universitätsbibliothek, 1427, fol. $17^{vb}$, fol. $17^{vb}$: "Alii dicunt quod duplex est scientia: ⟨quaedam⟩ qua scitur res esse (?) et proprietates sibi inesse; et illo modo dicunt quod de re corrupta non remanet haec scientia. Alia autem scientia qua scitur rem posse esse et proprietates sibi inesse posse; et illo modo de re corrupta remanet scientia."

52. Radulphus Brito, *Quaestiones super meteora*, MS Firenze, Biblioteca Nazionale Centrale, Conv. Soppr. E.1. 252, fols. $104^{vb}$-$105^{ra}$: "Dico duo ad quaestionem: primo quod de ipsis impressionibus non est scientia qua ostendantur esse, quia tales impressiones non sunt; si ergo de ipsis esset scientia qua ostenderentur talia esse, talis scientia esset aliquando falsa; quare etc. Dico tamen secundo quod de ipsis est scientia qua ipsa ostendantur posse esse, quia de illis potest esse scientia qua ostendantur ipsa posse esse vel fuisse de quibus certas habemus causas quibus scimus ipsa posse esse vel fore (*fortasse pro*: fuisse). Sed de impressionibus meteorologicis habemus certas causas quibus scimus ipsa posse esse vel fuisse; ergo etc. Maior patet, quia sicut causae se habent ad esse ita effectus (*pro*: effectus ita) ad cognosci ... Illae impressiones meteorologicae sciuntur fuisse vel posse esse ipsis abeuntibus. Et sic de ipsis est scientia ex suppositione causarum." Besonders interessant ist, daß Radulphus Brito seine Lösung als eine Variante der Lehre von der *scientia ex suppositione* bezeichnet. Zur handschriftlichen Überlieferung der Quästionen des Radulphus Brito zu den *Meteora* cf. Radulphus Brito, *Quaestiones super Priscianum Minorem* (Enders e.a.), I, p. 18. Zum Leben des Radulphus Brito und zu seiner Persöhnlichkeit cf. Radulphus Brito, *Der Kommentar des Radulphus Brito zu Buch III De anima* (Fauser), pp. 3-16.

von Brügge vom metaphysischen Standpunkt aus zurückgewiesen.[53] Gegen die Lehre vom *esse in suis causis* werden zwei Argumente vorgebracht. Es wird zunächst eingewandt, daß die Erkenntnis, die lediglich durch die Ursachen erworben wird, kein Erkennen eines Dinges gemäß seiner Natur und *in propria forma* darstellt, sondern nur eine unvollkommene Art des Wissens. Bartholomaeus von Brügge hebt aber zugleich hervor, daß dieser Einwand auf die Lehre vom *esse in suis causis*, wie sie von Aegidius Romanus formuliert worden war, nicht zutrifft, denn durch das Fortbestehen in den Ursachen habe Aegidius versucht, ein Erkennen des Dinges *in propria forma* zu begründen. Er habe nämlich behauptet, die Wesenheit des Dinges bleibe in den Ursachen erhalten, so daß das Ding an sich und im eigentlichen Sinne noch weiter erkennbar sei. Gegen die aegidianische Formulierung der Lehre vom *esse* in den Ursachen wird jedoch der Einwand wiederholt, den bereits Aegidius von Orléans erhoben hatte: Was in den Ursachen existiere, existiere nur potentiell; daher könne es lediglich in einer unvollkommenen und verminderten Weise erkannt werden.[54]

Bezüglich der Theorie der *scientia ex suppositione* macht unser Autor einfach den Einwand geltend, daß eine bedingte Wissenschaft nicht dem klassischen Modell der wissenschaftlichen Erkenntnis entspreche und kein Wissen im eigentlichen Sinne darstelle. Ein zweiter Einwand scheint auf den Gedanken hinauszulaufen, bei einer bedingten Wissenschaft sei der Unterschied zwischen dem faktisch nicht Existierenden und dem schlechthin Unmöglichen nicht mehr deutlich feststellbar. Wäre von der Mondfinsternis nur eine bedingte Wissenschaft möglich — so sagt Bartholomaeus — dann käme diesem Phänomen kein höherer Grad an Erkennbarkeit zu als einem absolut unmöglichen Sachverhalt, denn von unmöglichen Sachverhalten können ebenfalls wahre Aussagen in der Form von Konditionalsätzen gebildet werden.[55] Ähnliche Argumente werden gegen die Lösung der *scientia de possibili* vorgetragen: Eine *scientia de*

53. Bartholomaeus de Brugis, *Quaestiones super De generatione et corruptione*, MS Leipzig, Universitätsbibliothek, 1427, fol. 17$^{vb}$. Cf. auch *supra*, Anm. 16.

54. *Ibid.*, fol. 17$^{vb}$: "Sed obicitur istis quod scire rem secundum esse quod habet in causis est scire rem diminute et imperfecte ... Ad hoc frater Aegidius ... dicit quod scire rem secundum esse quod habet in causis suis potest intelligi dupliciter: uno modo scire causam, et sic ex consequenti scire effectum in quantum relucet in causa; et hoc non est scire effectum in propria forma et perfecte. Alio modo potest intelligi scire rem in suis causis secundum quod in suis causis remanet essentia rei; et sic dicit quod, manente re in suis causis, remanet scientia de eo perfecta ... Sed huic positioni contingunt difficultates, quia, sicut se habet esse ad esse, sic scientia ad scientiam; sed esse in potentia est esse diminute et esse in actu est esse perfectum; sic scientia de ente corrupto erit diminuta, et redibit idem quod prius ... " Cf. die *supra*, in Anm. 22 angeführte Stelle. Bartholomaeus von Brügge scheint jedoch Aegidius' knappe Bemerkung ergänzt und interpretiert zu haben.

55. *Ibid.*: "Alii dicunt quod duplex sit scientia: quaedam est scientia simpliciter dicta, alia est scientia condicionata, scilicet scire qualia rei possunt inesse si esset. Modo dicunt quod, re corrupta, non est scientia primo modo, sed secundo modo. Et differt illa positio a prima in hoc quod dicit quod sciret qualia sibi inessent si esset, quod non dicit alia. Sed non stat, quia tunc de illo esset scientia condicionata et non perfecta, de qua nos quaerimus. Item, tunc de re corrupta non esset magis scientia quam de impossibilibus, quia possemus scire de homine si

*possibili* entspreche weder dem klassischen Modell der Wissenschaft noch der normalen Praxis von Disziplinen wie der Astronomie oder der Meteorologie.[56]

Trotz dieser Einwände gegen die früheren Lösungsversuche kann jedoch die eigene Position des Bartholomaeus von Brügge als eine Kompromißlösung bezeichnet werden, denn im Fall eines nicht aktuell existierenden Gegenstandes räumt er sowohl die Möglichkeit einer Wissenschaft im eigentlichen Sinne als auch die einer Wissenschaft *ex suppositione* ein. Dabei stützt er sich auf die Unterscheidung mehrerer Arten der Erkenntnis. Zunächst werden die *scientia positiva* und die *scientia privativa* voneinander abgehoben. Die *scientia positiva* zeichnet sich durch die Anwendung bejahender Aussagen aus, während die *scientia privativa* negative Aussagen verwendet. Die *scientia positiva* zerfällt wiederum in die *scientia simpliciter* und die *scientia ex suppositione*, was auf die Unterscheidung zwischen kategorischen Sätzen und Konditionalsätzen zurückzuführen ist. Wenn nun etwas sowohl gemäß seinem *esse subsistentiae*, d.h. gemäß der aktuellen Existenz, wie auch gemäß dem *esse* in den Ursachen vergeht, dann bleibt nur eine privative Kenntnis möglich. Diese besagt nämlich, daß das Ding nicht existiert, wie z.B. hinsichtlich der Begriffe des Vakuums und des Unendlichen.[57] Bleibt dagegen das Ding wenigstens gemäß dem *esse* in den Ursachen erhalten, so billigt Bartholomaeus von Brügge zwar die Möglichkeit einer *scientia privativa* und einer *scientia ex suppositione* zu, zugleich will er aber auf den Gedanken einer Wissenschaft im eigentlichen Sinne nicht verzichten. Bei der Beantwortung der Frage, wie ein solches Wissen, welches aus bejahenden kategorischen Aussagen besteht, seine Geltung behalten könne, macht er sich im Grunde die Lösung des Aegidius Romanus zu eigen. Wenn etwas gemäß dem *esse* in den Ursachen erhalten bleibt, so sagt Bartholomaeus, dann bleibt gewissermaßen die Wesenheit gewahrt, und zwar wenigstens *causaliter*.[58]

Auch nach Ansicht dieses Autors kann darum die Wahrheit des wissenschaftlichen Satzes schließlich auf die nur potentielle Wesenheit als auf eine hinreichende ontologische Grundlage zurückgeführt werden. Er kann je-

esset asinus et quadrupes vel (?) huiusmodi ... " Die in der eben angeführten Passage erwähnte *prima positio* scheint die Lösung zu sein, die nur Aussagen *de possibili* zubilligt.

56. *Ibid.*

57. *Ibid.*

58. *Ibid.*, fols. 17$^{vb}$-18$^{ra}$: "His visis, dico ad quaestionem quod, re corrupta in se et in suis causis, non manet scientia positive dicta neque simpliciter neque condicionata. Secundo dico quod de eo (*pro*: ea) bene manet scientia privative dicta. Tertio dico quod, corrupta re in se, si tamen manet in suis causis, de eo (*pro*: ea) potest esse scientia positive dicta. Quarto dico quod cum eo (*pro*: de ea) potest esse scientia privative dicta ... Tertium declaratur, scilicet quod, manente re in suis causis et corrupta quantum ad esse subsistentiae, quod de eo (*pro*: ea) potest esse scientia simpliciter dicta ⟨et⟩ ex condicione, quia, manentibus illis quae requiruntur ad scientiam positivam simpliciter dictam et ex condicione, manet scientia positiva simpliciter et ex condicione ... Minor declaratur, quia res manet in essentia, saltem causaliter, et, per consequens, manet in proprietatibus, et sic possunt (?) habere scientiam de eo (*pro*: ea) simpliciter. Etiam manent quae requiruntur ad scientiam condicionatam ... "

doch nicht die Einwände der Gegner der Theorie des Aegidius ganz unbeachtet lassen; im Anbetracht solcher Argumente wird er zugestehen, daß die Erkenntnis eines nur potentiell existierenden Gegenstandes im Vergleich zur Erkenntnis des aktuell existierenden gleichsam als eine *scientia diminuta* gilt.[59]

*Wilhelm von Bonkes: das* esse habituale

Mit dem dritten Werk, den Quästionen des Wilhelm von Bonkes, der in den neunziger Jahren Magister in Oxford war,[60] gehen wir zur englischen Tradition über. Wegen des schadhaften Zustands des einzigen Zeugen jener Quästionen, der Handschrift Cambridge, Gonville and Caius College, 344, die ebenfalls andere Kommentare dieses Autors überliefert, werden wir jedoch die Auffassung des Wilhelm von Bonkes nur teilweise rekonstruieren können.[61]

Im Vergleich zu den bisher behandelten Werken ist die englische Herkunft von Wilhelms Quästionen leicht zu erkennen. Ein deutlicher Hinweis darauf ist z.B. das Auftauchen des Begriffes des *esse habituale*, der bekanntlich von Autoren wie Richardus Rufus von Cornwall und Wilhelm von Sherwood gebraucht und von Roger Bacon verworfen wurde.[62] Bei der Diskussion über die verschiedenen Lehrmeinungen bezüglich der Frage: "Utrum de corrupto possit esse scientia,"[63] wird das *esse habituale* von Wilhelm von Bonkes dem Begriff des *esse essentiae* zugeordnet. Er stellt auf diese Weise eine Lösung vor, die der klassischen essentialistischen Lehre sehr ähnlich ist: Ebenso wie bei der uns schon bekannten Formulierung wird auch nach dieser Auffassung die Möglichkeit einer Wissenschaft von nicht aktuell existierenden Dingen durch das Fortbestehen gemäß dem *esse essentiae* verbürgt. Zudem aber wird das *esse essentiae* mit dem *esse habituale* gleichgesetzt.[64] In Wilhelms Referat wird nicht erläutert, was mit den Begriffen "esse essentiae" und "esse habituale" gemeint sei, man könnte jedoch an Erläuterungen denken, die bei zeitgenössischen Autoren vorkommen. In seinen Quästionen zur Metaphysik spricht z.B. Richard von Clive, der im letzten Viertel des 13. Jahrhunderts ebenfalls in Oxford Ma-

59. *Ibid.*, fol. 18$^{rb}$: "Sed forte tu dices quod est scientia diminuta, quia in potentia respectu scientiae quae est entis in actu. Dico ad hoc quod, licet talis scientia sit diminuta respectu scientiae quae est entis in actu, existentia (*fortasse pro*: scientia) tamen est perfecta in tali natura, quia sic res non dicitur univoce, sed secundum prius et posterius, IV *Metaphysicae*. Sic neque scientia est diminuta respectu talis naturae quae corrupta est in se et manet in suis causis."
60. Emden, *A Biographical Register*, I, pp. 219-220.
61. Zu dieser Handschrift cf. James, *A Descriptive Catalogue*, I, pp. 387-388. Zu Wilhelms Quaestiones *De generatione* cf. Lohr, "Medieval Latin Aristotle Commentaries. Authors G-I," besonders p. 196.
62. Dazu cf. Ebbesen e.a., "Studies," besonders pp. 40-44; Braakhuis, "The Views of William of Sherwood"; Lewry, "Oxford Logic."
63. Guillelmus de Bonkes, *Quaestiones super De generatione et corruptione*, MS Cambridge, Gonville and Caius College, 344, fols. 93$^{rb}$-94$^{ra}$.
64. *Ibid.*, fol. 93$^{rb}$: "Ad quaestionem dicitur quod de illis quae sunt corrupta potest esse scientia, sed non sub ratione corruptorum, quia res habet multiplex esse: esse actu, et sic de re non est scientia, quia omnino de singularibus, sed de re secundum esse eius habituale et essentiale."

gister war, von *esse essentiae* und *esse habituale* als einer Art zeitlosen Seins, das der Wesenheit eigen ist.[65]

Was nun die von Wilhelm von Bonkes referierte Lösung betrifft, so kann sie folgendermaßen zusammengefaßt werden. Nachdem etwas gemäß dem *esse actuale* einmal vergangen ist, kann es gemäß dem *esse essentiae* erhalten bleiben. Zur Begründung dieses Fortbestehens bezieht man sich auf den Grundsatz, daß die aktuelle Existenz dem Individuum zukommt und daß die Wesenheit ihrerseits von den Prinzipien der Individuation unabhängig ist. Es wird ausdrücklich gesagt, daß auf Grund dieser Theorie die Wahrheit von Aussagen über bloß akzidentelle Bestimmungen nicht legitimiert werden kann, da sie das Individuum betreffen. Verbürgt wird dadurch allein die Wahrheit von Aussagen über Wesensbestimmungen und Eigenschaften, die vom Wesen herrühren. Da aber alle wissenschaftlichen Sätze ausschließlich dieser Gattung angehören, spielt die genannte Einschränkung in unserem Zusammenhang keine Rolle.[66]

Diese Lehre wird nun von Wilhelm von Bonkes als unhaltbar zurückgewiesen. Wie die Widerlegungen der Pariser Magister richtet sich auch seine Kritik gegen die metaphysischen Aspekte einer solchen Theorie. Welche Art des Seins — so lautet sein Einwand — ist unter den Begriffen des *esse essentiae* und des *esse habituale* zu verstehen? Es kann nicht als ein extramentales Sein aufgefaßt werden, da das extramentale Sein mit dem *esse actuale* identisch ist. Auch kann damit kein mentales Sein gemeint sein, denn das bloße Gedachtsein bildet keine hinreichende ontologische Grundlage für die Erkenntnis. Demgemäß erweist sich der Gedanke, beim Vergehen gemäß dem *esse actuale* könne etwas gemäß dem *esse essentiae* gewahrt bleiben, als unannehmbar. Zur Lösung der Frage nach dem Fundament der Wissenschaft muß daher — so schließt Wilhelm — ein anderer Ansatz gefunden werden.[67]

65. Zu diesem Autor, der 1276 *magister artium* und 1288 *magister theologiae* war, cf. Little e.a., *Oxford Theology*, pp. 257-259; Emden, *A Biographical Register*, I, pp. 444-445. Einige Exzerpte aus den Quästionen Richards von Clive zur Metaphysik sind bei Lewry, "Oxford Logic" (cf. besonders pp. 30-32 und 57-59) und Ebbesen, "Talking" (cf. besonders pp. 155-157), ediert.

66. Guillelmus de Bonkes, *Quaestiones super De generatione et corruptione*, MS Cambridge, Gonville and Caius College, 344, fol. 93$^{rb-va}$: " ... Et unum esse potest esse sine alio; et ideo de eis quae corrupta sunt, dummodo manet eorum esse essentiale, quod esse sufficit ad hoc quod sit scientia, potest esse scientia. Et esse scientiae est quod abstrahit ab omnibus principiis individuantibus, quia essentia non dependet a principiis individuantibus, et ita nec unum esse ab alio esse ... Et secundum hoc verificantur tales propositiones: 'homo est animal' et 'homo est risibilis' et non tales: 'homo est albus,' ut praedicatum respicit singulare primo. Unde, quia risibile consequitur essentiam secundum esse essentiae et albus consequitur rem secundum esse singulare, ideo est haec vera, 'homo est risibilis' si homo non sit, non tamen haec: 'homo est albus'."

67. *Ibid.*, fol. 93$^{va}$: "Contra. Omne esse aut est extra animam aut esse in anima; esse in anima est ut esse chimaerae, sed esse extra animam est esse actuale; unde quod est extra animam est hoc aliquid. Nihil igitur est dicere quod sit esse in habitu, quia esse in anima est esse intentione; unde lapis non est in anima, sed species lapidis. Ideo dicitur aliter quod esse essentiae est secundum quod res movet intellectum; et ideo secundum illud esse est res in intellectu ...

So werden im weiteren neben der Lehre vom *esse essentiae* noch mehrere Auffassungen in Betracht gezogen, unter denen sowohl die Lehre von der *scientia sub condicione* wie auch die Lehre vom *esse in suis causis* vorkommen.[68] Die Lösung Wilhelms von Bonkes zeichnet sich dadurch aus, daß der traditionelle Begriff des *esse habituale* dem des *esse* in den Ursachen zugeordnet wird. Er betrachtet das Problem des Wahrheitsgrundes von Aussagen wie z.B. "es kommt zur Mondfinsternis," wenn keine Finsternis aktuell existiert;[69] dabei bezieht er sich wahrscheinlich auf die Tatsache, daß eine solche Aussage selbst unter diesen Umständen als Schlußsatz eines Beweises fungieren kann. Als Wahrheitsgrund genügt nun nach Ansicht unseres Autors, daß der Finsternis ein *esse habituale* zukommt.[70] Unter dem Begriff des *esse habituale* scheint aber Wilhelm jenes *esse* zu verstehen, das die Finsternis in ihren Ursachen und in bezug auf ihre Ursachen besitzt. Soweit es sich aus dem an dieser Stelle stark beschädigten Text entnehmen läßt, wird insofern vom *esse habituale* einer Wirkung gesprochen, als sie "ex parte intentionis suarum causarum non impeditur."[71] Im Grunde erweist sich also die Lösung dieses Autors als ein Versuch, den innerhalb der englischen Tradition ziemlich beliebten Begriff des *esse habituale* vom Begriff des *esse essentiae* zu trennen, mit dem er in der ersten Auffassung verbunden war. Stattdessem beruft sich Wilhelm von Bonkes auf den aegidianischen Gedanken der potentiellen Existenz in den Ursachen.

Besonders interessant für die metaphysische Bestimmung des *esse habituale* angesichts des *esse* der Ursache einerseits und des *esse actuale* andererseits ist Wilhelms Diskussion einiger Einwände, welche er in bezug auf die aegidia-

Contra. Quantum ad esse in anima non est differentia inter chimaeram et hominem, licet quantum ad fundamentum verius ens sit homo quam chimaera ... Oportet igitur quaerere aliud fundamentum a parte rei ad hoc quod tales sint verae: 'luna eclipsatur,' 'homo est risibilis'." Im Gegensatz zur hier dargestellten Auffassung übernimmt Wilhelm von Bonkes nach Lewrys Auslegung in seinen Quästionen zur Schrift *Peri hermeneias* (ebenfalls im MS Cambridge, Gonville and Caius College, 344 überliefert) den Gedanken eines zeitlosen *esse quidditativum*, das von der aktuellen Existenz der Individuen ganz unabhängig wäre; dazu cf. Lewry, "The Oxford Condemnations," insbesondere pp. 246-247. Die Stellen, auf die Lewry sich bezieht, konnten jedoch nicht nachgeprüft werden.

68. Guillelmus de Bonkes, *Quaestiones super De generatione et corruptione*, MS Cambridge, Gonville and Caius College, 344, fol. 93$^{va}$: "Et illud fundamentum tripliciter ponitur. Uno modo sub condicione, ut, quandocumque luna est in tali situ, eclipsatur ... Ideo ponitur aliter quod esse est triplex: esse in anima et esse extra animam, et hoc dupliciter: aut in se aut in suis causis. Secundum primum esse non est unio in propositione, propter praearguta. Nec de re secundo modo est scientia, quomodo dicimus quod prima substantia est per se, et secundum illud esse non est scientia de re corrupta, licet posset esse de re sempiterna. Tertio modo est scientia de re secundum tertium esse, ut secundum esse in suis causis. Unde licet res corrumpatur, adhuc manet esse in suis causis; unde licet eclipsis non sit, quia tamen causa eius manet, ideo de eclipsi potest esse scientia."

69. Dazu cf. die *supra*, in Anm. 67 angeführte Stelle.

70. *Ibid.*, fol. 94$^{ra}$: " ... Oportet tamen, ad hoc quod res propositionis sit, quod res extra sit in actu vel habitu. Sic ad illam: 'quaerentes quid est et ignorantes si est nihil quaerunt,' verum est nisi sit actu vel habitu ... "

71. *Ibid.*, fol. 93$^{vb}$.

nische Lehre vorgetragen hatte, die aber genauso gut für seine eigene Theorie gelten. Erstens: Wie soll das *esse habituale* der Wirkung in den Ursachen verstanden werden? Handelt es sich um das *esse* der Ursache selbst oder um etwas Hinzugefügtes? Zweitens: Wenn die Ursachen hinreichende Prinzipien der Erkenntnis der Wirkung darstellen, so daß die Wirkung durch die Ursachen bewiesen werden kann, dann sind sie auch hinreichende Prinzipien ihrer Existenz. Im diesen Fall entfällt jedoch jeder Grund für die Unterscheidung zwischen *esse habituale* und *esse actuale*.[72] Bemerkenswert an Wilhelms Beantwortung solcher Einwände ist nun, wie er sich darum bemüht, von dem Verständnis des *esse habituale* als einer von potentieller Existenz in den Ursachen unterschiedlichen Realität Abstand zu halten. Demgemäß lehnt er entschieden die Annahme ab, das *esse habituale* der Wirkung füge etwas Reales zum *esse* der Ursache hinzu.[73] Nach seiner Ansicht scheint es sich dagegen gänzlich in die Potentialität der Ursache hinsichtlich der Hervorbringung der Wirkung aufzulösen. Was die Unterscheidung zwischen *esse habituale* und *esse actuale* betrifft, so wendet Wilhelm von Bonkes den Begriff "impedimentum" an. Seine Lösung lautet etwa folgendermaßen: Wenn die Ursachen existieren und alle Hindernisse beseitigt worden sind, dann wird der Effekt ins aktuelle Sein hervorgebracht; wenn dagegen das Wirken der Ursachen behindert wird, dann besitzt der Effekt nur ein *esse habituale* in den Ursachen selbst.[74]

### *Anonyme Quästionen im Codex Oxford, Oriel College, 33: das* esse quidditativum

Als viertes Werk wollen wir eine anonyme Sammlung von Quästionen in Betracht ziehen, die in der Handschrift Oxford, Oriel College, 33 tradiert wird. Diese Handschrift ist als wichtiger Zeuge zahlreicher Kommentare zum *Corpus Aristotelicum* bekannt, unter denen insbesondere die Quästionen zur Ethik und zur Schrift *De anima* des englischen Magisters Johannes von Tytynsale zu nennen sind, der in den achtziger Jahren in Oxford tätig war.[75] Was nun die Herkunft der anonymen Quästionen zur Schrift *De generatione*[76] betrifft, so

72. *Ibid.*, fol. 93$^{va-vb}$.
73. *Ibid.*, fol. 94$^{ra}$: "Ad aliud, quando quaeritur: 'illud esse habituale aut addit aliquid supra esse suae causae,' dico quod nihil reale addit ... "
74. *Ibid.*, fol. 94$^{ra}$: "Ad aliud, quando dicitur quod passio scitur per principia sufficientia sui subiecti, dico quod effectus dicitur habere esse a sua ... Vel a sua causa remoto omni impedimento, et sic, posita causa, necessario ... effectus; et tunc effectus dicitur habere esse actualiter a sua causa (a sua causa actualiter *scr. sed corr.*). Alio modo ... a sua causa cum impedimento; et illud est esse effectus habituale." Wegen des schadhaften Zustands der Handschrift an dieser Stelle kann nur ein unvollständiger Text angeführt werden. Der Sinn der Passage scheint jedoch in seinen Grundzügen klar genug.
75. Zum Inhalt dieser Handschrift cf. Coxe, *Catalogus*, I, pp. 11-12. Zur neueren Literatur über den genannten Codex und zur Persöhnlichkeit des Oxforder Magisters Johannes von Tytynsale cf. Thro, "A Question."
76. MS Oxford, Oriel College, 33, fols. 98$^{ra}$-114$^{vb}$; nach Coxe fols. 95-111 (die Folien dieser

fällt jedenfalls schon auf den ersten Blick auf, daß der Autor mit der Pariser Tradition vertraut ist, denn er kennt die Kommentare Alberts des Großen und des Aegidius Romanus, die sogar namentlich zitiert werden.[77] Wie sich in der folgenden Analyse herausstellen wird, verrät seine Behandlung der Frage: "Utrum, corrupta re, maneat scientia de eadem,"[78] einen starken Einfluß des Aegidius, dessen Lösung er sich zu eigen macht, wobei er jedoch, wie noch zu zeigen sein wird, eine subtile und bedeutende Änderung vornimmt; denn dem aegidianischen Gedanken des *esse* in den Ursachen ordnet er jenen Begriff des *esse quidditativum* zu, den Aegidius verworfen hatte.

Bei der Behandlung der Frage stellt nun der anonyme Autor drei Meinungen vor, und zwar die Lehre vom *esse essentiae*, die Lehre von der *scientia ex suppositione* und die Lehre vom *esse in suis causis*, die ausdrücklich Aegidius zugeschrieben wird. Gegen die beiden ersten Lösungsversuche werden einige Einwände vorgetragen, von denen manche bereits im Kommentar des Aegidius Romanus vorkommen. Beim Vergehen der Individuen — so wendet der Anonymus gegen die These vom *esse essentiae* ein — kann die Wesenheit wegen ihres universalen Charakters nicht erhalten bleiben. Wenn das *esse in effectu* nicht zur Wesenheit gehört — so wird ferner hervorgehoben — dann ist es jedoch wenigstens eine von der Wesenheit unmittelbar abhängige Eigenschaft. Entfällt aber die unmittelbare Wirkung einer Ursache, so ist die Ursache ebenfalls aufgehoben.[79] Was die Lösung der *scientia ex suppositione* betrifft, setzt sich der Anonymus, wie bereits Aegidius, mit dem Gedanken auseinander, die wissenschaftlichen Aussagen hätten lediglich eine bedingte Wahrheit. Denn wäre das der Fall — so sagt der Autor — dann verlöre die Wissenschaft ihre

Handschrift sind mehrmals numeriert worden). Die Quästionen erstrecken sich nur über die Kapitel 1 bis 7 des ersten Buches.

77. Cf. z.B. *ibid.*, fol. 98$^{vb}$: "Ad Eraclitum dicendum secundum Albertum quod forma, ut existit in hac materia sensibili vel illa, certam cognitionem habere non potest propter mutabilitatem materiae, nec sic considerat physicus formam in materia. Forma tamen ut existit in materia sensibili non hac vel illa, sed abstracta ab his secundum rationem, certam cognitionem habet." Dazu cf. den Kommentar Alberts des Großen zur Schrift *De generatione*, tract. I, cap. 1, p. 110$^{7}$ ff. Cf. auch MS Oxford, Oriel College, 33, fol. 98$^{va}$: "Ad illud dicit Aegidius secundum Aristotelem versus finem II *Posteriorum*: 'sensus est universalis, sentire singularis'"; dazu cf. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), I, fol. 2$^{vb}$. Außerdem cf. die *infra*, in Anm. 81 angeführte Stelle.

78. MS Oxford, Oriel College, 33, fols. 99$^{va}$-100$^{rb}$.

79. *Ibid.*, fol. 99$^{vb}$: "Dicitur quod esse est duplex, actualis existentiae et essentiae; destructa re secundum primum esse, manet penes secundum. Et quia essentia est proprium obiectum intellectus, etiam esse essentiale rei indicatur per definitionem, adhuc potest manere intellectus de re, et similiter definitio et, per consequens, scientia. Sed ista responsio fundatur super quoddam falsum, quod patet dupliciter. Si esse in effectu non sit de essentia rei, erit passio immediate consequens essentiam; est enim esse primus actus essentiae ... Sed manifestum est quod, ablato effectu primo et immediato, aufertur causa eiusdem ... Praeterea, secundum esse actualis existentiae habet res quod sit particularis et individualis, secundum esse essentiae quod consideretur ut universalis. Sed dicit Aristoteles in *Praedicamentis*: destructis primis, impossibile est aliquod aliorum remanere ... "

Geltung, sobald die Voraussetzung entfiele. Ferner ist nach seiner Ansicht eine Erkenntnis der vergänglichen Dinge, die von deren Existenz abhängt, nur eine Erkenntnis "de re contingenti in quantum contingens," da den vergänglichen Dingen die Existenz nur kontingent zukommt.[80]

Seinerseits hält der Autor an der Lösung des Aegidius Romanus fest: Selbst wenn ein Phänomen wie die Finsternis nicht aktuell existiert, behält unsere Erkenntnis der Finsternis ihre Geltung, weil die Finsternis gewissermaßen in den Ursachen fortbesteht.[81] Der klassische Einwand gegen die aegidianische Lehre, ein nur potentiell in den Ursachen Existierendes sei kein angemessener Gegenstand der Erkenntnis, wird für den Autor zum Anlaß, eine wichtige Präzisierung einzuführen. Seine Erwiderung erinnert an Gedanken, die bereits bei Aegidius vorkommen, daß nämlich die Erkenntnis im eigentlichen Sinne sich auf die Wesenheit richtet, und zweitens, daß angesichts des Verständnisses der Wesenheit als einer Potentialität zur Existenz die potentielle Existenz in den Ursachen der *ratio quidditatis* genügt.[82]

Im Vergleich zur Lösung des Aegidius scheint jedoch der Anonymus einen Schritt weiter zu gehen, denn er betrachtet das *esse* in den Ursachen sozusagen als Substrat eines weiteren Seins, das in den Ursachen gewahrt bleibt. Diese Art des Seins, das *esse quidditativum*, also das Sein der Wesenheit, ist nach Ansicht des Anonymus das eigentliche ontologische Fundament der Erkenntnis. Bliebe das *esse quidditativum* nicht in den Ursachen erhalten — so hebt der Autor hervor — dann könnte der Gedanke des Seins in den Ursachen zur Lösung der Frage nach der Grundlage der Wissenschaft gar nichts beitragen. Darüber hinaus wird das *esse quidditativum* als eine Aktualität beschrieben, wenn auch nicht existentieller Art, denn nur das, was gewissermaßen an der Aktualität teilhat,

**80.** *Ibid.*: "Propter quod dicitur aliter, quod de re non existente potest scientia haberi, sed sub condicione, puta si res sit; de pluvia enim non ente potest sciri quod est aqua guttatim cadens sub hac condicione: 'dum est' ... Sed nec illud valet, quia scientia habita de aliquo sub condicione solum non manet ulterius sublata condicione ... Sed illud est vanum dicere, quod, adveniente hieme, amittat aliquis scientiam quam prius habuit de rosa ... Iterum, secundum illud de re contingenti in quantum contingens esset scientia, quia rei corruptibili, quae quandoque est et quandoque non est, contingenter accidit suum existere; ergo, si non sciatur res nisi sub hac condicione, 'si est,' eius, ut contingens est, erit scientia solum et non aliter."

**81.** *Ibid.*, fols. 99$^{vb}$-100$^{ra}$: "Tertio modo dicitur aliter ab Aegidio quod res habet triplex esse: unum in re extra, aliud in suis causis et tertium in anima ... Cum ergo quaeritur an (esse *add. sed exp.*) scientia de re perimatur perempto esse eius, dicitur quod, non manente esse rei in se et in suis causis, tollitur omnis scientia de re, manente esse rei in suis causis, licet non in se, manet et scientia, quia adhuc manere potest definitio exprimens distincte causas definiti. Et definitio est principium scientiae; ideo et scientia adhuc manet."

**82.** *Ibid.*, fol. 100$^{ra}$: " ... Et quod illud sit possibile manifestum est sic. De ratione quidditatis est secundum se quod sit in propinqua potentia ad suum esse tamquam ad sui primam actualitatem. Res vero, dum est in causis propriis, secundum hoc esse est in propinquissima potentia ad esse eius in rerum natura sive ad esse eius in effectu, quod idem est. Ergo considerare rem secundum esse eius quod habet in suis causis, hoc erit maxime considerare rem secundum suam quidditatem. Et quidditas rei est proprium obiectum intellectus; ideo secundum hoc esse verissime intelligitur res et scitur."

kann als Gegenstand der Erkenntnis betrachtet werden.[83] Vergleicht man nun diese Überlegungen mit der Auffassung des Aegidius Romanus, dann wird eine subtile Änderung der Perspektive deutlich. Der aegidianische Begriff des *esse* eines Dinges in den Ursachen beinhaltet nur den Hinweis auf die Potentialität der Ursachen zur Hervorbringung des Dinges. Einem jeden Ding wird nämlich insofern das *esse* in den Ursachen zugesprochen, als die Ursachen existieren, die es ins Sein hervorrufen können. Dem Effekt selbst kommt dabei aber lediglich eine potentielle Existenz zu, die in der Potentialität der Ursachen gründet. Nach dem Anonymus hingegen bleibt etwas von dem Ding in den Ursachen gewahrt. Das *esse quidditativum* ist nämlich dem Ding selbst eigentümlich, sogar als eine Art der Aktualität, nur in den Ursachen bewahrt ("salvatum"), denn diese Art des Seins kann sowohl im aktuell existierenden Individuum fundiert sein wie auch in dessen Ursachen.

Im Grunde scheint also der Anonymus den Kritikern der aegidianischen Lehre recht zu geben: Das *esse* in den Ursachen ist an sich keine hinreichende Grundlage des Erkennens. Seine Antwort auf diesen Einwand besteht nun darin, daß nach seiner Ansicht "esse in den Ursachen" etwas mehr bedeutet als die bloße Potentialität der Ursachen zur Hervorbringung des Effekts. Die Theorie des *esse in suis causis* läßt sich nämlich dadurch rechtfertigen, daß etwas von dem Effekt selbst in den Ursachen gewahrt bleibt, was als eigentliches Fundament der Erkenntnis fungieren kann.

Es ist nun offensichtlich, daß eine solche Auffassung eine gewisse Ähnlichkeit mit der ersten essentialistischen Lösung vom Fortbestehen gemäß dem *esse essentiae* trägt. Der Anonymus gibt ohnehin zu, daß die Wesenheit auch beim Vergehen des Dinges gemäß dem *esse actuale* gewissermaßen erhalten bleiben kann.[84] Er glaubt jedoch, die metaphysischen Schwierigkeiten der genannten Lösung zu beheben, indem er als Substrat des *esse essentiae* die Ursachen

83. *Ibid.*, fol. 100$^{ra-rb}$: "Ideo dicendum ad quaestionem quod, destructo esse rei secundum se, tollitur scientia de re, quia principium scientiae est definitio, et definitio non competit alicui nisi secundum aliquem actum, et omnis actus rei praesupponit esse eius; ideo scientia de re esse rei praesupponit quod sit eius secundum se; et ideo dicit Philosophus quod de non ente non est scientia. Quia tamen res universaliter apprehensa ab intellectu et per modum universalis esse quidditativum habet in suis propriis causis etiam nullo supposito eius existente, ut rosa in hieme, ideo de re secundum tale esse eius sufficienter habetur scientia. Quod si causae possent esse in actu praeter hoc quod res haberet esse proprium (proprium *interl.*) secundum se in illis causis, non esset scientia de re propter esse causarum, quia esse illarum esset rei in potentia tantum. Sed quia quidditas rei habet quoddam esse secundum se, salvatum tamen in suis causis, ideo de re est scientia per se nullo eius supposito manente. Et ideo distinctio praedicta modicum operatur ad solutionem quaestionis, quia esse rei in causis voco esse eius proprium, in causis suis tamen salvatum."

84. *Ibid.*, fol. 100$^{rb}$: "Sed secundum ista apparet quod essentia maneat esse existere destructo. Et dicendum quod verum est. Nam quidditas rei, ut universaliter concipitur, quae est proprium obiectum intellectus, secundum aliquod esse manet, ut in propriis causis, quolibet supposito illius destructo; aliter enim impossibilis esset scientia de re. Sed illud esse non est existere quidditatis, quia quidditati non debetur existere nisi quia supposito cuius est quidditas, et ita per accidens."

voraussetzt. Es handelt sich dabei um keine Wiederaufnahme des Platonismus — so kann sein Schlußsatz verstanden werden — denn der Wesenheit liegt immer das Partikuläre zugrunde, entweder der aktuell existierende Träger selbst oder seine Ursachen, die ebenfalls partikuläre Dinge sind.[85]

### *Fragment eines Kommentars im Codex Oxford, Oriel College, 33: das Fortbestehen der intelligiblen* species

Das letzte Werk, das hier untersucht wird, ist ebenfalls im Codex Oxford, Oriel College, 33 erhalten. Wie sich aus den Titeln der wenigen, kurzen Quästionen entnehmen läßt, handelt es sich dabei anscheinend um ein Fragment eines Kommentars zur Schrift *De generatione*.[86] Unter dem Titel: "Utrum, rebus transmutatis vel destructis, possibilis sit scientia de illis," wird unsere Frage diskutiert.[87]

Bei der Erläuterung dieser Frage behandelt der Autor einen einzigen Lösungsversuch, und zwar die aegidianische Lehre vom *esse in suis causis*: Hinreichende ontologische Grundlage der Wissenschaft sei das *esse* in den Ursachen. Gegen die genannte Lösung wird ein Einwand angeführt, der uns schon bekannt ist. Die lediglich durch die Ursachen erworbene Erkenntnis sei keine Erkenntnis eines Dinges *sub propria ratione*, weil das nur potentiell in den Ursachen Existierende keinen angemessenen Gegenstand des Wissens darstelle.[88] Zweitens wird hervorgehoben, daß allein das aktuell Seiende eine Wirkung ausüben kann, wobei der Anonymus sich wahrscheinlich auf das Problem der

85. *Ibid.*, fol. 100$^{rb}$: " ... Verum est quod essentia comparatur ad esse existere sicut$^{1}$ potentia ad actum, sicut$^{2}$ proprium subiectum ad propriam passionem (sicut$^{2}$ ... passionem *mg.*), quia essentia est susceptivum ipsius esse. Sed non semper sic comparatur ad esse proprii suppositi, sed vel huius vel suarum causarum; et ideo essentiae sufficit quod vel suppositum cuius est actu existat vel quod causae et principia illius immediata actu existant ... Ad aliud dicendum quod verum est, 'destructis primis etc.' Sed manentibus propriis causis rei, non destruuntur prima totaliter, quia illae causae sunt primae substantiae." An dieser Stelle antwortet der Autor auf die Einwände, die er gegen die essentialistische Lösung vorgetragen hatte (cf. die *supra*, in Anm. 79 angeführte Passage), die aber seine eigene Auffassung ebenfalls betreffen.

86. Coxe (*Catalogus*, p. 11) verzeichnet dieses Fragment (MS Oxford, Oriel College, 33, fol.183$^{rb}$-183$^{va}$; nach Coxe, fol. 180) unter dem Titel: "Quaestio utrum rebus transmutatis vel destructis possibilis sit scientia de illis." Dieser Frage folgen jedoch eine kurze Anmerkung ("Notandum quod haec consequentia est necessaria quam facit Philosophus: si unum tantum sit principium materiale omnium, alteratio non differt ab ipsa generatione secundum intellectum antiquorum ... ") und zwei weitere Quästionen ("An Democritus mente potuit capere quod posuit; posuit corpora indivisibilia infinita et figurata ... ," "An sequatur, si non est transmutatio in substantiis, nec in qualitatibus"), die sich offensichtlich auf die von Aristoteles in *De generatione et corruptione*, I, 1 behandelten Themen beziehen. Darum liegt der Verdacht nahe, daß es sich um ein Fragment eines Kommentars zu dieser aristotelischen Schrift handelt.

87. *Ibid.*, fol. 183$^{rb}$.

88. *Ibid.*: "Dicitur propter istas rationes quod res habet triplex esse: in se ipsa, in suis causis et in anima. Et ista se habent secundum ordinem; unde, destructis rebus secundum esse in se, dummodo habeant esse in suis causis vel in anima, hoc sufficit ad habendum scientiam de ipsis. Contra: scientia perfecta rei est eius secundum propriam rationem; unde qui cognoscit hominem in quantum causatur, perfecte hominem non cognoscit, sed diminute. Res in suis causis seu principiis solum habet esse imperfectum et potentiale; ergo res secundum tale esse non generat scientiam perfectam rei ... "

Entstehung der intelligiblen *species* bezieht, durch welche der Verstand seinen Gegenstand erkennt.[89]

Was die eigene Lösung des Autors betrifft, so beantwortet er die Frage positiv; wie Aegidius billigt er die Möglichkeit einer Wissenschaft im eigentlichen Sinne von nicht aktuell existierenden Gegenständen. Im Vergleich zu der aegidianischen Lehre bewegt sich jedoch seine Auffassung in einer ganz anderen Perspektive, denn er geht von einem psychologischen Standpunkt aus, der gewöhnlich mit dem Namen des Robert Kilwardby verknüpft wird. In einer Sammlung von Sophismata, die zu den zweifelhaften Werken Kilwardbys gezählt wird, war bekanntlich die Wahrheit von notwendigen Urteilen über nicht aktuell existierende Gegenstände durch das Fortbestehen der Begriffsinhalte im erkennenden Verstand erklärt worden.[90] Auf ähnliche Überlegungen beruft sich nun auch die Lösung des Anonymus. Etwas ist nur insofern erkennbar — so sagt der Autor — als es vom Verstand betrachtet wird. Weil nun die *species*, durch welche der Verstand den extramentalen Gegenstand erkennt, von der aktuellen Existenz dieses Gegenstandes unabhängig ist, so daß sie nach dessen Vergehen in der erkennenden Seele unverändert besteht, kann die Wissenschaft auch dann gewahrt bleiben, wenn die Dinge vergangen sind.[91]

Bemerkenswert an dieser Perspektive ist, daß sie genau im Gegensatz zu einem Standpunkt steht, der uns schon bekannt ist, nämlich zur Lehre von der *scientia ex suppositione*. Auf Grund eines streng im Sinne der faktischen Wahrheit gefaßten Wahrheitskriteriums hatte Aegidius von Orléans den Gedanken zurückgewiesen, das Fortdauern der Denkinhalte im Verstand sei eine hinreichende Grundlage der Erkenntnis, denn "Wahrheit" beinhaltet nach seiner Meinung eine Beziehung des Verstandes zur Wirklichkeit.[92] Bei dem Anonymus finden wir die entgegengesetzte Auffassung: Das Fortbestehen der *species* genügt, um eine vollkommene Erkenntnis des Gegenstandes zu fundieren. Ferner räumt der Anonymus im Fall eines nicht aktuell existierenden Gegenstandes die Möglichkeit einer Wesensdefinition ein. Im Anschluß an Aristoteles stimmt er der These zu, daß das Sein des Wissenschaftssubjekts

89. *Ibid.*: "Et praeterea, unumquodque movet sicut est in actu; res in suis causis solum habet esse in potentia; ergo completa et actualis cognitio de re requirit aliud esse quam esse in suis causis." Dazu cf. auch *infra*.

90. Diese Sammlung von Sophismata ist im Codex Erfurt, Wissenschaftliche Bibliothek der Stadt, Amplon. Q. 328 erhalten. Zu der vom Autor vertretenen Auffassung cf. Lewry, "The Oxford Condemnations," pp. 245-246; id., Lewry, "Grammar," insbesondere p. 423. Zur Verfasserschaft dieses Werks cf. auch Braakhuis, "Kilwardby."

91. MS Oxford, Oriel College, 33, fol.183$^{rb}$: " ... Cum igitur res non intelligitur nec scitur nisi per hoc quod speciem facit in intellectu — res enim non scitur ut existit — similitudo manet eiusdem rationis, quae est principium cognoscendi rem, et etiam propria ratio rei quae est definitio, sive res existat nunc actualiter in suo supposito sive non, ideo, corrupta re secundum suum existere in supposito, dummodo existebat et se alicui offerebat, manet eadem scientia in eo quae prius."

92. Cf. die *supra*, in Anm. 33 zitierte Stelle.

vorausgesetzt werden muß. Es handle sich jedoch nicht um die aktuelle Existenz, sondern lediglich um das "esse non prohibitum"; das Wissenschaftssubjekt könne nämlich nicht ein solches sein, daß ihm die Existenz widerstreite.[93]

Die einzige Bedingung, die der Anonymus an den möglichen Gegenstand einer Wissenschaft stellt, ist, daß er einmal aktuell existierte.[94] Im Hintergrund steht wahrscheinlich das schon erwähnte Problem der Entstehung der begrifflichen Vorstellungen, durch welche die äußeren Dinge erkannt werden: Nur das aktuell Existierende vermag eine Wirkung auf den Verstand auszuüben, so daß eine intelligible *species* hervorgerufen werden kann.[95] Auf Grund dieser Überlegungen erkennt der Anonymus die oben vorgebrachten Einwände gegen die aegidianische Lehre vom *esse* in den Ursachen als zutreffend an. Denn aus der Betrachtung dessen, was nur in den Ursachen existiert — so hebt er hervor — kann eine vollkommene Erkenntnis nicht gewonnen werden; der Gegenstand der Wissenschaft muß daher wenigstens einmal an sich und aktuell existiert haben.[96]

Hinsichtlich der Phänomene, die nicht immer existieren, wie die Mondfinsternis, beruft sich der Anonymus auf den uns schon bekannten Gedanken des Verhältnisses der Wirkung zu seinen Ursachen. Demgemäß stimmt er der These zu, daß die notwendige Abhängigkeit solcher Phänomene von den Ursachen die Grundlage ihrer Erkennbarkeit darstellt, denn die wissenschaftliche Erkenntnis besteht in dem durch einen Beweis aus den Prinzipien erworbenen Wissen. Daher kann als *scibile* nur das angesehen werden, was aus seinen Ursachen und Prinzipien abgeleitet werden kann.[97] Maßgebend an der Lösung des Anonymus scheinen jedoch die psychologischen Erwägungen, die oben dargestellt wurden.

93. MS Oxford, Oriel College, 33, fol.183$^{rb}$: "Ad primum argumentum dicendum quod non intelligit Philosophus quod oportet supponere de subiecto esse actualis existentiae, sed sufficit quod esse non sit sibi prohibitum, et sic glosat Avicenna. Unde de eo quod non est cui est esse prohibitum non contingit scire quid est; de eo tamen quod non est quia non existit actu, dummodo esse habuit, bene contingit scire quid est."
94. *Ibid.*: "Dicendum quod, destructa re quantum ad actuale existere eius in supposito, dummodo praefuit secundum actum, potest scientia manere."
95. Cf. die *supra*, in Anm. 89 angeführte Stelle.
96. MS Oxford, Oriel College, 33, fol.183$^{rb}$: "Ad alia dicendum quod utraque ratio concludit verum, sed non ad propositum, quia cognitio rei in suis causis est [in]potentialis et imperfecta. Unde quod aliquis haberet scientiam de re aliqua cuius esse solum percipiebat [solum] in suis ⟨causis⟩, hoc est impossibile. Verum tamen, quod aliquis scientiam nunc perfectam habeat de rosa quae esse non habet nisi in suis causis, dummodo illam scientiam non acquirebat in suis causis, sed secundum esse eius actuale existere, hoc non est inconveniens."
97. *Ibid.*: " ... Etsi enim non semper sit eclipsis lunae absolute, eclipsim tamen lunae per comparationem ad suam ⟨causam⟩ esse est necessarium et sempiternum. Quia igitur scientia nihil aliud est quam effectus demonstrationis, ut conclusio, in demonstratione ex principiis sciti scitur conclusio; quod igitur est necessarium respectu principiorum et causarum est scibile. Huiusmodi sunt illa quae aliquando sunt et aliquando ⟨non⟩."

## Schlußbemerkungen

Bei der Diskussion über den Wahrheitsgrund der Erkenntnis, so wie sie sich gegen Ende des 13. Jahrhunderts im naturphilosophischen Bereich entwickelt, treten nach dem oben Dargestellten drei Grundlösungen in den Vordergrund: die Lehre vom *esse essentiae*, die Lehre von der *scientia ex suppositione* und die Lehre vom *esse in suis causis*, die mit dem Namen des Augustiner-Magisters Aegidius Romanus verknüpft ist. Wie schon bemerkt, ist die erste Auffassung sozusagen die einfachste Lösung, denn die Notwendigkeit des wissenschaftlichen Satzes wird unmittelbar auf einen gewissermaßen unvergänglichen Gegenstand als ihren Grund zurückgeführt. Die Einwände gegen diese Auffassung sind metaphysischer Art; sie richten sich gegen ihren allzu deutlichen platonistischen Anklang.

Die Theorie der *scientia ex suppositione* stellt den Gegenpol zu dieser Auffassung dar, denn sie läuft auf die Trennung des Problems der Notwendigkeit der Wissenschaft von der metaphysischen Frage nach einem unvergänglichen Gegenstand hinaus. An die Stelle der metaphysischen tritt dabei eine logische Frage, welche Art von Aussagen nämlich nicht die Existenz des Gegenstandes unter ihren Wahrheitsbedingungen voraussetzt. Daß in bezug auf die weitere Entwicklung der Diskussion im Spätmittelalter dieser zweite Ansatz der einflußreichste ist, liegt klar auf der Hand. Auf diese Tradition greift ohne Zweifel z.B. Wilhelm von Ockham zurück, wenn er die Notwendigkeit des Erkennens, das nach seiner Meinung immer nur mit kontingenten Dingen zu tun hat, auf die Notwendigkeit des wissenschaftlichen Satzes reduziert, welcher den unmittelbaren Gegenstand des Wissens darstellt.[98] Zugleich gilt, daß die *scientia ex suppositione* von den hier betrachteten Autoren nur für einen Grenzfall und für eine unvollkommene Art der Erkenntnis gehalten wird, weil sie nicht dem klassischen Modell der Wissenschaft entspricht. Wissenschaft im eigentlichen Sinne scheint auch für Autoren wie Aegidius von Orléans nur diejenige zu sein, die sich in bejahenden kategorischen Sätzen ausdrückt und ihre Geltung durch einen beständigen Gegenstand ausweisen kann.

Im Vergleich zur Lehre von der *scientia ex suppositione* bewegt sich die aegidianische Auffassung in einem viel traditionelleren Rahmen; sie erweist sich im Grunde lediglich als ein Versuch, die essentialische Lösung von ihren allzu realistischen Voraussetzungen zu befreien. Weil nun die Theorie des *esse in suis causis* am traditionellen Ansatz festhält, ohne andererseits zu weit den

98. Cf. Guillelmus de Ockham, *Summa logicae* (Boehner e.a.), III, 2, cap. 5, besonders pp. 513-514: "Ex isto etiam patet quomodo de contingentibus potest esse scientia; quia secundum quod veniunt in demonstrationem necessaria sunt, hoc est propositiones formatae de terminis importantibus talia contingentia quae veniunt in demonstrationem sunt necessariae, quae non sunt mere de praesenti et de inesse, categoricae et affirmativae, sed vel sunt negativae vel hypotheticae vel de possibili vel alio modo, vel aequivalentes eis." Zu Ockhams Auffassung cf. Scott, "John Buridan," besonders pp. 659-660; De Rijk, "The Development," besonders p. 52.

Weg des Platonismus zu verfolgen, findet sie bei den Zeitgenossen des Aegidius Anklang. Sie weist aber eine innere Schwäche auf, die in den Argumenten ihrer Kritiker deutlich zum Ausdruck kommt: Wie kann, was an sich nur potentiell existiert, als ein adäquater Gegenstand der Erkenntnis betrachtet werden? Der Rückgriff des anonymen Kommentators der Oxforder Handschrift auf ein *esse quidditativum* ist offensichtlich ein nachträglicher Versuch, diese Schwierigkeit zu überwinden.

Zum Schluß dieses Beitrages sei noch eine geschichtliche Bemerkung hinzugefügt. Wie auch immer der philosophische Wert und die Auswirkungen der aegidianischen Auffassung sein mögen, aus der vorliegenden Analyse ergibt sich jedenfalls ein unbestreitbares historisches Faktum bezüglich der Rezeption des Kommentars des Aegidius Romanus zur Schrift *De generatione et corruptione*: Gegen Ende des 13. und bis zum Anfang des 14. Jahrhunderts war dieses Werk im philosophischen Milieu weitgehend bekannt. Seine weite Verbreitung darf uns nicht wundern, denn sie ist kein Sonderfall. Sie kann vielmehr als Bestätigung eines Forschungsergebnisses angesehen werden, zu dem die Historiker schon seit einiger Zeit gelangt sind, daß nämlich Aegidius Romanus sich als Kommentator des *Corpus Aristotelicum* bei seinen Zeitgenossen einen Ruf erworben hatte, wie er nur Autoren vom Rang eines Thomas von Aquin oder eines Albert des Großen zukam. Diese Tatsache findet auch in der Bezeichnung *Novus Expositor* ihren Ausdruck, die dem Augustiner-Magister in Abgrenzung zu Thomas, dem *Antiquus Expositor*, zugebilligt wurde.[99]

99. Dazu cf. Donati, "Studi," Teil I, pp. 5-6, Anm. 8, und die dort angeführte Literatur; Donati, "Per lo studio," insbesondere pp. 366-373.

# Scientific Knowledge and Contingent Reality. Knowledge, Signification and (Natural) Supposition in Buridan's *Questions on De generatione et corruptione*

*Henk A. G. Braakhuis*

It is well known that thirteenth-century philosophers, when adopting the general lines of Aristotelian philosophy, became aware only gradually of the consequences or implications of some of the central tenets of this philosophy. This holds true, for example, for the theory of the eternity of the species, which implied the eternity of the world as a whole. It holds true also for the theory of the sensible knowledge of the singular, because of its implication that no intellect, not even God's, could have knowledge of the singular. The same seems to hold true, too, for one of the central tenets of Aristotle's theory of scientific knowledge, namely the view that the object of scientific knowledge is of necessity and is eternal,[1] which entailed that there can be no scientific knowledge of what is generated and perishable and is only contingent. This is, at any rate, the impression one obtains from a glance at thirteenth-century commentaries on Aristotle's *De generatione et corruptione*, the first work in the sequence of Aristotle's corpus of natural philosophy as studied at the universities to deal explicitly with the changing reality of contingent beings. Thus, Albert the Great's paraphrase of the *De generatione et corruptione* presents, for example, only a short digression on the impossibility of real knowledge of transient beings, a digression that in itself looks rather traditional inasmuch as it discusses this impossibility only within the framework of ancient philosophy and refers for the impossibility of such knowledge only to the viewpoint of Heraclitus.[2] It is only in the seventies of the thirteenth century, and in particular in Giles of Rome's *Commentaries on De generatione et corruptione*, which date from around 1274, that we find a real discussion of the problem of the possibility of knowledge of transient beings from a contemporary point of view. From that period on-

1. Aristoteles, *Ethica Nicomachea* VI, 3, 1139b19-25; cf. also *Metaphysica* V, 5, 1015b11-15.
2. Cf. Albertus Magnus, *De generatione et corruptione* (Hossfeld), pp. $109^{rb}$-$111^{ra}$. For a study of the relation of the digressions of Albert in this work to later commentaries, cf. Caroti, "Note," *passim*.

ward, and possibly under the influence of Giles's commentaries, which seem to have functioned as a sort of model for later commentaries, we regularly find discussions of this problem placed at the beginning of commentaries on *De generatione et corruptione*.[3]

It is also well known how, in particular in the fourteenth century, the problem of the object of scientific knowledge was eagerly debated. Especially for the fourteenth-century nominalists, Aristotle's view that the object of scientific knowledge had to be universal, necessary and eternal, constituted a problem of considerable difficulty. Because of their conviction that in extra-mental reality there exist only concrete, singular, and hence transient and contingent, beings, they had no place whatsoever for universal, necessary and eternal beings in the nether world which could provide the basis of scientific knowledge. However, since they wished to remain faithful to the Aristotelian criteria of scientific knowledge, they had to find other bearers for the universal and eternal necessity that formed Aristotle's cornerstone of scientific knowledge.

In view of the above, it will not come as a surprise to see that in the beginning of John Buridan's *Questions on De generatione et corruptione*, the problem of the possibility of scientific knowledge of beings coming into being and passing away is brought into sharp focus. Whereas in the commentaries of both Giles of Rome and Giles of Orleans, the problem is discussed under two headings, namely by asking whether there can be scientific knowledge of corruptible things and whether, if something has passed away, there can remain scientific knowledge of it,[4] John Buridan devotes the first *three* questions of his commentary to this problem. Two questions which resemble those discussed by Giles of Rome and Giles of Orleans are here followed by a third question which asks whether a word signifies the same irrespective of whether the thing it signifies exists or has already passed away (*utrum vox significet idem, re existente et corrupta*). By introducing, into this context, a semantical issue which had been eagerly discussed in the late thirteenth century, namely whether a word can lose its signification, Buridan makes it clear that for him, the problem of scientific knowledge has an essentially semantic character.

In the present contribution, I shall discuss these first three questions of Buridan's *Questions on De generatione et corruptione*.[5] Although it will become apparent that Buridan's views as expressed in these three questions do not differ considerably from those offered in similar questions to be found in his other works,[6] the questions he discusses here nevertheless add to a better

3. Cf. the contribution by Silvia Donati in this volume.
4. Cf. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fols. $2^{va}$-$3^{vb}$ and Aegidius Aurelianensis, *Quaestiones super De generatione et corruptione* (Kuksewicz), pp. 3-12.
5. For a complete list of the questions of Buridan's commentary, see the *Appendix* 1.
6. These questions are mainly: (1) Johannes Buridanus, *Quaestiones super decem libros Ethico-*

understanding of his views and form a further testimony to the importance he attached to the semantic aspect of problems of scientific knowledge and to the role he assigned to a correct analysis of the propositions in which we express our scientific knowledge.

The first question takes us directly to the heart of the matter by addressing the problem of whether there can be scientific knowledge of things that come to be and pass away (*utrum de generabilibus et corruptilibus sit scientia*). The arguments presented for denying such knowledge are the traditional ones and are therefore rather similar to the ones presented, for example, by Giles of Orleans in the same context.[7] They declare that there can be no (scientific) knowledge of what does not exist; that there can be no scientific knowledge of what is singular; that all scientific knowledge is of what is necessary and eternal and incapable of being otherwise; and that there is no scientific knowledge of what is not intelligible.[8] The only counter-argument states that Aristotle intended to offer such scientific knowledge in his *De generatione et corruptione*. But, according to Buridan, the problem is not difficult to solve if one takes into consideration certain distinctions. Within the limits of demonstrative scientific knowledge, Buridan wishes to introduce a threefold distinction: knowledge of a conclusion; knowledge of the terms of which the conclusion consists; and knowledge of the thing(s) signified by the terms of which the conclusion consists. Only when taken in the third sense can there be scientific knowledge of the heaven and all other things, while when taken in the first two ways, there can only be scientific knowledge of propositions and of their terms.[9] Buridan thereupon

*rum Aristotelis ad Nicomachum* (Paris, 1513) VI, 6, fols. $121^{vb}$-$123^{rb}$: utrum omne scibile sit eternum. There is a translation of most of the text in Hyman e.a, *Philosophy in the Middle Ages*, pp. 705-710. (2) Johannes Buridanus, *Summulae De suppositionibus* (Van der Lecq), 4.3.4: De divisione suppositionis communis in naturalem et accidentalem, pp. 45-49. This new edition differs in important points from the older one in Reina, "Giovanni Buridano," pp. 206-208. There is a translation of this text in *Jean Buridan's Logic* (King), pp. 125-128. For a study of both these texts cf. in particular Scott, "John Buridan," *passim* and De Rijk, "The Development," pp. 47-68. (3) Johannes Buridanus, *Questiones longe super librum Perihermeneias* (Van der Lecq), I, qu. 2: *utrum omne nomen significat aliquid*, pp. $7^{28}$-$14^{38}$.

7. Cf. Aegidius Aurelianensis, *Quaestiones super De generatione et corruptione* (Kuksewicz), pp. 3.
8. ... quia quod non est, non contingit sciri, ... de singularibus non est scientia, ... omnis scientia est de necessariis et perpetuis impossibilibus aliter se habere, ... de illis non est scientia que non sunt intelligibilia.
   For the citations of Buridan's text I have used the manuscripts that are mentioned in the note to the *Appendix* 2 A. Since the citations aim simply at presenting the content of the text, I have refrained from giving variant readings.
9. Ista questio de facili solvitur per distinctiones. Et primo sciendum quod, licet "scientia" et "scire" dicantur multipliciter, tamen ad presens non intelligo nisi de scientia demonstrativa. Item sciendum quod tripliciter de aliquo potest esse scientia demonstrativa: uno modo tamquam de conclusione demonstrata vel demonstrabili, alio modo est scientia demonstrativa de aliquo tamquam de termino ex quo conclusio demonstrata vel demonstrabilis componitur, tertio modo

makes it clear that necessity and eternity and their counterparts, contingency and corruptibility, should be understood as "what cannot possibly be otherwise" and "what can possibly be otherwise," respectively. By that account, necessity might be attributed to a thing in its being — and in this sense no conclusion may be considered necessary —, or it might be attributed to the truth of a proposition. But even this can only be done correctly when it is attributed conditionally, in the sense that whenever a proposition is formed, it is true and cannot be false.[10] On the basis of these distinctions, Buridan presents his conclusions, of which the second is the most pertinent to the problem of the scientific knowledge of things coming into being and passing away. In this conclusion, he states that when "necessary" and "scientific knowledge" are employed in the right way, there is scientific knowledge of corruptible things just as there is of eternal things, since every thing in the world can be signified by transcendent and other general terms.[11] In this way Buridan makes it clear how, according to him, the criteria of necessity and eternity which scientific knowledge should satisfy may be reconciled with the contingent nature of the things in this world and how, even by means of contingent, singular, and token-reflexive propositions, there can exist necessary scientific knowledge even of merely corruptible things.

The view expressed in this question, to the effect that scientific knowledge does not only concern conclusions or propositions in general and the terms these consist of, but also the very things signified by these terms, is very much in keeping with a number of other texts by Buridan in which he stresses the importance of scientific knowledge of the things themselves. Our question resembles in particular his *Quaestiones super octo Physicorum libros Aristotelis* (Paris, 1509), I, qu. 1.[12] The two texts differ, however, inasmuch as in the latter question, Buridan distinguishes between four senses of scientific knowledge, adding to the three senses we have already encountered also the knowledge of

est scientia demonstrativa de aliquo tamquam de re significata per aliquem terminum ex quo conclusio demonstrata componitur. Et illo ultimo modo est scientia de celo et intelligentiis et omnibus rebus, sed primo modo et secundo modo non est scientia de aliquo nisi de propositionibus et de terminis significativis.

10. Item quod aliqua propositio sit necessario vera, adhuc intelligitur dupliciter, scilicet bene vel male. Quia si dicamus simpliciter quod aliqua propositio sit necessario vera, hoc est falsum, quia omnis propositio potest non esse vera, quia potest non esse. Alio modo potest intelligi necessitas propositionis sub conditione, scilicet: quandocumque talis propositio formatur, ipsa est vera et non potest esse falsa.
11. Secunda conclusio: quod, capiendo secundo modo "necessarium" vel "perpetuum," tam de necessariis quam de corruptibilibus est scientia, tertio modo capiendo "esse scientiam de aliquo," scilicet tamquam de re significata per aliquem terminum conclusionis. Quoniam, sicut scitur, isti termini "ens," "unum," "idem," "diversum," "causa," "causatum" ponuntur in multis conclusionibus demonstrabilibus vel demonstratis, et cum omnis res de mundo significetur per aliquem illorum terminorum, igitur illo tertio modo habetur scientia de omnibus rebus tam perpetuis quam corruptibilibus.
12. See Johannes Buridanus, *Quaestiones super octo Physicorum libros Aristotelis* (Paris, 1509), I, qu. 1, fols. $2^{rb}$-$3^{ra}$. For this text, cf. also Thijssen, "Buridan on the Unity of a Science," in particular, pp. 94-95.

the premises. A further difference is that in the commentary on the *Physics*, he accepts the various senses of "scientific knowledge" to be equivocal, stating expressedly that the proper sense concerns the scientific knowledge of a demonstrated conclusion.[13] This is completely absent from our present text. As in the *Physics* text also in our text it is said that the signification of things in this world may be accomplished in first instance by means of transcendent and other general terms. So, as does the *Physics* text, our text has a great emphasis on the process of signifying by means of which we express our knowledge of the world.

On the assumption that there exists scientific knowledge of corruptible things, the second question of Buridan's *Questions on De generatione et corruptione* discusses the problem of whether, when these pass away, our scientific knowledge of them also passes away (*utrum ad corruptionem rerum corruptibilium corrumpatur scientia de illis, supposito quod de illis habeatur scientia*). One of the arguments presented in favor of such a disappearance is based on the view of truth as a correspondence between intellect and thing, a view that cannot allow, of course, for a correspondence to an inexistent object. When the thing signified by a concept or term does not exist, that term will supposit for nothing and so the proposition, at least in its affirmative form, will be false.[14] As a counter-argument, it is argued that from such a view it would follow that there can be no firm scientific knowledge of natural objects, while in fact our knowledge consists for the better part of knowledge of just such things. In this context, the author specifically refers to our knowledge of rare and transient phenomena such as thunder and eclipses.[15] By means of these arguments, Buri-

13. Cf. Johannes Buridanus, *Quaestiones super octo Physicorum libros Aristotelis* (Paris, 1509), fol. 2$^{va}$: Ad demonstrationem autem plura concurrunt, scilicet premisse et conclusio et termini ex quibus constituuntur premisse et conclusiones, et res significate per illos terminos. Et de omnibus illis dicitur haberi scientia, licet non eodem modo, sed equivoce, scilicet secundum diversas rationes attributas procedunt ad unam, a qua nomen primo impositum est. Nam proprie scientia demonstrativa dicitur esse de conclusione que demonstratur.
14. Tertio. Omnem conclusionem scitam oportet esse veram, ut patet primo *Posteriorum*; sed conclusio non potest esse vera, si res significata non sit; igitur non potest manere scientia, re significata non manente. Minor probatur, quia: solet describi veritas quod veritas est adequatio intellectus ad rem intellectam vel significatam; modo illius quod non est non est adequatio ad intellectum; ergo si res significata non est, nulla est veritas de ea apud intellectum. Et confirmatur illud, quia: si res significata per intellectum vel per terminum non est, tunc terminus pro nullo supponit, et si terminus pro nullo supponit, propositio est falsa, saltem affirmativa; ideo, re non existente, non manet veritas apud intellectum.
15. Oppositum arguitur, quia sequeretur quod de rebus naturalibus non haberemus aliquam firmam scientiam. Sed consequens est falsum, quia scientie pro maiori parte sunt de rebus naturalibus et corruptibilibus et tamen sunt vere et firme. Et probatur conclusio, quia illa scientia non esset firma que corrumperetur in te propter corruptionem aliarum rerum, te manente. Secundo experimur quod habens scientia per librum Metheorum de tonitruis et coruscationibus, cometis et multis talibus non perdit scientiam de eis, licet aliquando talia non sint. ... Similiter experimur quod astrologi habent certam scientiam de eclipsibus solis et lune, licet raro sint tales eclipses.

dan makes it clear that what is at stake here is indeed the very possibility of scientific knowledge of nature.

Buridan introduces his own answer to this question by telling that there are people who, when faced with this dilemma, maintain that the object of scientific knowledge is nothing other than the demonstrative conclusion itself, because this is the only thing which is known to be true; which means that for them, there is nothing outside the mind that can be known scientifically.[16] Apparently, Buridan refers here to the views of Ockham or to Ockhamist views, although is must be said that Ockham himself also allows for scientific knowledge of the things in reality as far as they are signified by the terms. Nevertheless his view on this point is less outspoken than Buridan's.[17] Buridan makes it soon clear that he is of another view. He holds that although it is true that the immediate object of scientific knowledge is the demonstrable conclusion, it is nevertheless also true that by means of such a conclusion we have knowledge of the extra-mental, concrete things which are signified by such a conclusion or by the terms of which it consists. For Buridan, it would be absurd to state that a metaphysician should possess no knowledge of, say, animals and stones. After all, our reason for worrying about conclusions is precisely that we endeavour to obtain knowledge of the things themselves. Thus we see that Buridan here, like in other texts of his, emphasizes that our knowledge has as its objects principally the things themselves. In accordance with this notion, he states, just as in those other texts,[18] that "the knowable" can be taken in two ways, either with reference to the demonstrable conclusion, or with reference to the things signified by its terms.[19] When "knowable" is taken in the first sense, the knowledge of an object admittedly disappears when the object perishes. When it is taken in the second sense, a knowable thing has a threefold way of being, either in the mind, or in its causes, or else in itself or its full being.[20] Some argue that when something

16. Et propter hoc aliqui posuerunt nichil sciri de novo demonstrative nisi conclusionem demonstrabilem, quia solet dici quod scientia est habitus conclusionis demonstrate, et quia nichil scitur nisi verum, ... et cum verum est apud animam in compositione vel divisione, igitur nichil est scibile nisi conclusio demonstrata; et sic nichil extra animam esset scibile.
17. For this point cf. Thijssen, "Buridan on the Unity of a Science," pp. 94-95.
18. Cf. in particular Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum* (Paris, 1513), VI, qu.6, fol. 122$^{ra}$ (cf. Scott, "John Buridan," p. 662).
19. Tamen aliter ponendum est, unde licet concedamus quod conclusio demonstrabilis est immediatum obiectum scibile, tamen debet concedi quod per scientiam huiusmodi conclusionis sciuntur res significate per illam conclusionem seu per terminos illius conclusionis. Unde absurdum est dicere quod metaphysicus non habeat scientiam de animalibus vel lapidibus; ymmo scientiam non querimus principaliter de conclusionibus nisi ad cognoscendum res, puta: Deum et corpora celestia et alias res naturales. Debemus igitur dicere quod dupliciter potest capi "scibile": uno modo pro conclusione demonstrata vel demonstrabili, loquendo de mentalibus, alio modo pro rebus significatis per terminos conclusionis.
20. Si autem capiamus "scibile" pro re significata per terminos, tunc dicimus rem scibilem habere esse tripliciter: uni modo apud animam, ... sed aliud esse habet res in suis causis, et aliud habet esse si res habet esse in se ipsa sive in actu producto.

is known demonstratively, it is known only according to the being it has in its causes.[21] This is obviously the division proposed, and the position defended, by Giles of Rome in his commentary on *De generatione et corruptione*.[22] Giles' opinion is rejected, the reason being that the scientific knowledge we have of natural things is knowledge of them in their actual being.[23] Without presenting any further opinions, Buridan proceeds to present his conclusions where he lists the types of scientific knowledge that remain possible after the passing away of its object.[24] These are:

- negative knowledge, e.g. that no horse is a donkey;[25]
- affirmative hypothetical, conditional knowledge;[26]
- affirmative hypothetical, temporal knowledge;[27]
- categorical and affirmative knowledge of the possible;[28]
- affirmative knowledge of being (*de inesse*) — because of the fact that although the individuals pass away, the species always remains; which is the way in which Aristotle and other philosophers believed propositions such as "man is an animal" to be necessary and knowable;[29]
- finally, Buridan states that if the supposition, according to which the verb "is" is taken indifferently for all the tenses, is admitted, then the thing for which the term in the conclusion supposits, will be present, with the result that even in the case where no rose should exist, the proposition "a rose is a beautiful flower" would be true. And he adds that this is the

21. Et tunc dicatur quod non sciatur demonstrative quantum ad tale esse (*scil.* esse in actu producto, *HB*), ymmo solum quantum ad esse quod habet in suis causis. Et hoc est quod dicebatur et hoc est etiam quod dicit una opinio.
22. See Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fol. 3$^{va}$. Cf. the contribution by Silvia Donati in this volume.
23. Sed ego credo quod hec opinio sit falsa inquantum dicit quod non habeatur scientia de rebus quantum ad esse earum in actu producto, quia Aristotiles credidit se demonstrasse quod, quandocumque est pluvia in actu producto, ipsa est aqua guttatim cadens de nubibus. Similiter omnes naturales credunt se scire quid est equus in actu producto et similiter homo et sic de aliis.
24. Et ideo dimitto quasdam opiniones et pono statim aliquas conclusiones.
25. Quarum prima est: licet res sciatur et scita corrumpatur, tamen manet scientia negativa de ipsa. Unde si tu scis quod nullus equus est asinus, adhuc manebit tua scientia et vera, si omnes equi et asini corrumperentur, quia adhuc esset verum et scitum quod nullus equus est asinus.
26. Secundo etiam bene manet scientia ypotetica, scilicet conditionalis. Quia quamvis nullus asinus esset et equus, tamen tu vere scires quod omnis equus, si est, est hinnibilis, et ita vere scires quod omnis tonitruus, si est, est sonus factus in nubibus, dato quod iam nullus sit tonitruus.
27. Tertio et remanet scientia affirmativa ypotetica temporalis, quia credo quod hec est vera "quandocumque est pluvia, ipsa est aqua guttatim cadens de nubibus." Et sic sciuntur multa naturalia que non sunt.
28. Quarto etiam remanet scientia cathegorica et affirmativa de possibili, nam licet iam nullum sit tonitruum, tamen scimus esse possibile.
29. Adhuc quinto dico quod manet scientia de inesse affirmativa, licet res scite successione posteriori corrumpantur; per hoc enim quod animalia generantur semper salvatur species. Et ita Aristotiles et alii philosophi crediderunt ista propositiones esse necessarias "homo est animal," "equus est animal," "homo est risibilis," "asinus est rudibilis" et crediderunt illas esse scibiles.

> intended sense of Aristotle's *dictum de omni* in the *Posterior Analytics* (*Anal. Post.* I 4, 73a 27ff.), so that "every man is an animal" means that "if this is a man, it is an animal" and "whenever this is a man, it is an animal." This supposition he believes to be equivalent to a temporal or conditional proposition.

Buridan is thus able to conclude that evidently, truth does not pass away just because of the passing away of things.[30]

It must have become clear from the above that our question provides a parallel with the well-known question Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum*, VI, 6 on whether everything knowable is eternal (*utrum omne scibile sit eternum*).[31] There we find also the distinction between a twofold way of accepting the knowable;[32] a reference to the view of Giles of Rome on the threefold way of the being of things; the rejection of his view that one possesses scientific knowledge of things only with respect to the being they have in their causes; and the counter-argument of our question to rebut this view.[33] The discussion, in the *Ethics*-commentary, of the problem of scientific knowledge of inexistent things for a system that takes truth to consist in the *adequatio* of the intellect to the object it knows,[34] is also found in our question, where it appears, however, as the main argument *quod sic*. Furthermore, we find in both texts a reference to the opinion according to which we have only scientific knowledge of the demonstrable conclusion or of propositions in general.[35] The concluding solution, finally, offered in the *Ethics*-commentary, which proposes a hypothetical, conditional, and omnitemporal interpretation of demonstrative propositions such as "every man is an animal," declaring it to be valid also for propositions such as "thunder is sound in the clouds," is found in our question, too, as is the defense of this interpretation by an appeal to Aristotle's *dictum de omni*.[36]

30. Adhuc et ultimo dico, si concedatur suppositio illa quod hoc verbum "est" accipiatur indifferenter pro omni tempore, presenti, preterito et futuro, tunc res esset presens pro qua supponit terminus in conclusione, ita quod, licet nulla esset rosa, tamen hec esset vera "rosa est flos pulcher spinis crescens." Et ita videtur quod Aristotiles utatur illa suppositione primo *Posteriorum* dicens quod de omni dico quod non est in aliquo sic et in aliquo non sic nec aliquando sic nec aliquando non sic. Sic illa est de omni "omnis homo est animal," quia dicit ipsa: si hoc est homo, hoc est animal et quandocumque hoc est homo, ipsum est animal. Ita etiam hec est de omni quantum spectat ad demonstrationem tantum "tonitruum est sonus factus in nubibus." Et vos videtis quod illa suppositio equivalet temporali vel conditionali, de quibus prius dicebatur. Et sic videtur quod non aufertur veritas propter corruptionem rerum.
31. For the references, cf. above, n. 6.
32. See Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum* (Paris, 1513), fol. 122$^{ra}$.
33. See *ibid.*, fol. 122$^{rb}$.
34. See *ibid.*, fol. 122$^{va}$.
35. For the *Ethics*-commentary, see *ibid.*, fol. 122$^{va-vb}$.
36. For the *Ethics*-commentary, see *ibid.*, fols. 122$^{vb}$-123$^{ra}$.

Nevertheless, there are also important differences. Thus the Buridan of our present text seems to uphold the validity of affirmative knowledge of being (*de inesse*) because of the fact that although the individuals pass away, the species always remains,[37] whereas in the *Ethics*-commentary he rejects this view as being beside the point.[38] Another difference is that in the solution of the *Ethics*-commentary, the name "natural supposition" is found several times, whereas in the parallel passage in our question this name is not found and is spoken of only as "that supposition."[39] Further, in the *Ethics*-commentary, the acceptability of natural supposition is argued for by stressing that nouns which signify things without consignifying any determinate time, signify present, past, and future things indifferently. In our question, by contrast, "that supposition" is presented as the one according to which the verb "is" may be taken for every time, present, past, and future, indifferently. A striking point is also that in our question it is added that according to that supposition the thing for which the term in the conclusion supposits, would be present; whatever that may mean.[40]

The differences between the two texts appear even more clearly if the form of our question in the other (and earlier?) redaction, which is found in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, and which I will call the Vatican-redaction, is taken into consideration.[41] There the presentation of the arguments *quod non* and *contra*; the reference to the view that only the

37. See the text quoted above in n. 29.

38. See Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum* (Paris, 1513), fol. 122$^{va}$: Sed adhuc puto nec illud esse necessarium, quoniam, sicut dictum fuit, non oportet medicum amittere scientiam de rosis, si nulle sint rose etc. Credo tamen quod res scibiles pro quibus termini conclusionis supponunt, non oportet esse perpetuas aliquo predictorum modorum, sed possibile est eas sic ex toto esse corruptibiles quod aliquando sit verum dicere quod nulla talis res est.

39. See the text quoted above in n. 30. It must be said, though, that MS Kraków, Biblioteka Jagiellonska, cod. 654., fol. 81$^{vb}$ gives the reading *suppositio naturalis*.

40. See the text quoted above in n. 30 (... tunc res esset presens pro qua supponit terminus in conclusione ... ). It should be noted that MS Kraków, Biblioteka Jagiellonska, cod. 654, *ibid.*, presents once more a variant reading: Ultimo dico quod si concedatur suppositio naturalis, secundum quam hoc verbum "est" accipiatur indifferenter pro omni tempore, presenti, preterito vel futuro, tunc remanet veritas de aliquo affirmativa de inesse, licet nulla res sit presens pro qua termini supponant in conclusione.
I am at the moment unable to decide which reading is the correct one. But in any case, the reading presented in the other MSS. I have used, gives an indication of the way in which Buridan's view was interpreted later on.

41. For this other redaction of Buridan's *Questions on De generatione et corruptione*, see Michael, *Johannes Buridan*, II, pp. 642-647 and Thijssen, "Buridan," pp. 72-80. They propose, independently of each other, that the questions on *De generatione et corruptione* which are found in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fols. 103$^{ra}$-145$^{vb}$, which A. Maier had ascribed to Nicole Oresme, of which there is a list of questions found in MS Cesena, Biblioteca Malatestiana, S. VIII. 5, fol. 3(4)$^{ra}$-3(4)$^{vb}$, and of which there are at least two questions found also in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2185, fols. 50$^{ra}$-51$^{va}$, form another redaction of Buridan's commentary. See now also Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), in particular, p. 61*, n. 16. Michael, *Johannes Buridan*, II, p. 647 suggests that this redaction is an earlier one.

demonstrable conclusion is knowable; the distinction between "knowable" as the demonstrable conclusion and as the things for which the terms of the conclusion supposit; are all the same as in our redaction. But the divergence between the redactions begins with the discussion over the definition of "knowable" as the things for which the terms of the conclusion supposit. The Vatican-redaction starts by drawing attention to the doubts among the doctors;[42] and proceeds by discussing a view that distinguishes between the knowledge of the essence and that of the existence of an object, a view that is rejected.[43] Next comes the view of Giles of Rome, whom Buridan mentions here by name and whose arguments he rejects in a similar way as in the *Ethics*-commentary.[44] In his own conclusion, Buridan first declares that after the things have passed away, there still remains: negative knowledge, affirmative knowledge about the possible, and affirmative hypothetical, i.e. conditional, knowledge.[45] There remains, however, no affirmative categorical knowledge of the existence, or stated otherwise, with "is" as second adjacent.[46] Buridan goes on to explain that some believe that there remains also no affirmative categorical knowledge with "is" as third adjacent.[47] After having presented these conclusions, Buridan raises an objection, which he takes to be real, namely that when these conclusions, and in particular the last ones, were true, there would be no difference between the scientific knowledge we have of thunder and many other phenomena of nature and the knowledge we have of the vacuum or of chimeras.[48] But this cannot be true, because we

42. Johannes Buridanus, *Quaestiones super libros De generatione et corruptione*, MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097: Sed si "scibile" accipiatur alio modo, scilicet pro rebus pro quibus termini conclusionis supponunt, tunc est maior dubitatio inter doctores.
43. *Ibid.*: Aliqui dicunt sic: quod scientia potest esse de aliqua re, vel quantum ad eius essentiam vel // fol. 105$^{ra}$ // quidditatem vel quantum ad eius esse ... Hiis prenotatis ponunt talem conclusionem quod rebus corruptis manet bene scientia de eis quantum ad quidditatem et essentiam, sed non manet scientia de eis quantum ad esse et existere ... Ista opinio est falsa ...
44. *Ibid.*: Alia opinio est Egidii super illum locum. Dicit quod res potest habere triplex esse ... Sed credo quod illa opinio non valet, quia ...
45. *Ibid.* (fol. 105$^{rb}$): Ideo credo aliter fore respondendum et faciliter, et ponitur prima conclusio illa quod rebus corruptis manet scientia de eis negativa ... Secunda conclusio ponitur quod rebus corruptis adhuc potest manere scientia affirmativa de possibili ... Tertia conclusio est quod rebus corruptis potest bene manere scientia affirmativa ypothetica de inesse, sicud hec est vera conclusio scibilis: "si tonitruum est, ipsum est sonus in nubibus" ...
46. *Ibid.*: quarta conclusio: quod si non maneant res, non manet scientia affirmativa categorica de hoc verbo "est" secundo adiacente, sicud si nullum sit tonitruum, ego non possum habere scientiam quod tonitruum sit ...
47. *Ibid.*: quinta conclusio ab aliquibus ponitur quod etiam, si res non maneat, non manet scientia affirmativa categorica de "est" tertio adiacente. Cuius ratio est, quia: non manente veritate, non manet scientia; sed si non maneat res, non manet veritas propositionis de "est" tertio adiacente. Quia: si nullum sit modo tonitruum, illa est falsa "tonitruum est sonus in nubibus," quia ad talem propositionem de "est" tertio adiacente sequitur propositio de "est" secundo adiacente, sequitur enim "tonitruum est sonus in nubibus; ergo tonitruum est."
48. *Ibid.*: Sed contra illas conclusiones est vera obiectio, quia si ille conclusiones essent vere, sequeretur quod aliter non haberemus scientiam // fol. 105$^{va}$ // de tonitruis, pluviis, coruscationibus, et entibus naturalibus pluribus quam de vacuo vel chymera.

have more positive knowledge of thunder and the like than of the vacuum, the infinite and chimeras. Of these last we have in fact only negative and affirmative hypothetical, i.e. conditional, knowledge,[49] while of the former, we have, firstly, affirmative categorical knowledge of the possible, and, secondly, affirmative, hypothetical, — that is, not only conditional, but also temporal and causal — knowledge.[50] Thirdly, there exists, according to some, affirmative categorical knowledge with "is" as third adjacent, where as the terms are taken in natural supposition. He then goes on to explain the distinction between natural and accidental supposition as it was made by the older logicians.[51] He ends his answer by stating that he thinks that this interpretation according to the natural supposition amounts to the same as that of the hypothetical, (omni)temporal, knowledge presented earlier.[52]

Compared with the redaction we have discussed earlier, this Vatican-redaction seems to be in greater agreement with the question from the *Ethics*-commentary. It discusses, for example, the view that distinguishes between knowledge of the essence and that of the being or existence, which is found also in the *Ethics*-commentary. And, like there, we find here Giles of Rome's view referred to by name, but then rejected in a form that is more comparable to the *Ethics*-commentary than to the other redaction of the *De generatione et corruptione* commentary. Even the list of the types of knowledge that are possible after the passing away of the things are, in the Vatican-redaction, more in line with the *Ethics*-commentary. Particularly, like there, this Vatican-redaction indicates the natural supposition with its full name and explains it with a reference to the view of the older logicians. Also the fact that the natural supposition

49. *Ibid.*: Falsitas patet: magis habemus scientiam positivam de istis quam de illis. Confirmatur, quia: de vacuo et infinito vel chymera habemus scientiam negativam et affirmativam hypotheticam, scilicet "si vacuum est, vacuum est locus" ⟨etc.⟩, ...

50. *Ibid.*: quia de tonitruo et coruscationibus habemus scientiam affirmativam categoricam de possibili ... Secundo quia de tonitruo et coruscationibus habemus scientiam hypotheticam, non solum conditionalem, sed temporalem et causalem; unde scimus hanc conclusionem "omne tonitruum, quandocumque fuit, erit vel est, fuit, est vel erit sonus in nubibus."

51. *Ibid.*: Tertio dicunt aliqui quod de tonitruo et coruscatione potest haberi scientia categorica affirmativa de inesse de "est" tertio adiacente, prout tamen termini capiuntur secundum suppositionem naturalem.
Et circa hoc est notandum quod antiqui loyci distinguebant inter suppositionem naturalem et accidentalem. Suppositionem naturalem dixerunt esse, quando terminus supponit indifferenter pro omnibus suis suppositis presentibus, preteritis vel futuris sine aliqua restrictione, suppositionem accidentalem, quando supponit restrictus pro presentibus tantum vel pro preteritis tantum vel pro futuris tantum. Sic ergo, quando dicitur "omne tonitruum est sonus in nubibus," si isti termini accipiuntur secundum suppositionem accidentalem, ut scilicet "sonus" supponat pro presentibus, sic dicunt quod propositio sit falsa, si nullum sit tonitruum, si autem accipiuntur secundum suppositionem naturalem, ita quod hoc verbum "est" accipiatur indifferenter ad presens, preteritum et futurum, quia non habemus aliud verbum, sic illa est vera "omne tonitruum est sonus in nubibus."

52. *Ibid.*: Credo quod illo modo sensus huius propositionis vero (non *MS*) est hic ille qui datus est, ita scilicet quod omne tonitruum, quandocumque fuit, est vel erit, est vel fuit vel erit sonus in nubibus.

is presented in this redaction as based in first instance on the unrestricted supposition of the noun with as effect, so to say, the omnitemporal acceptance of the verb "is," is more in line with the presentation in the *Ethics*-commentary. However, the reference to Aristotle's *dictum de omni* is absent from this redaction. It is moreover striking that in this redaction, Buridan does not make it clear that he himself endorses the natural supposition; he just reports it as a view held by some, which in fact amounts to the same as a hypothetical, omnitemporal, proposition, which he himself holds to be possible. This position is quite different from the *Ethics*-commentary and also from the *Summulae, De suppositionibus*, and is in fact more in agreement with the rather hesitating way in which Buridan speaks about "that supposition" in the other redaction of our question.[53] Particularly interesting in the Vatican-redaction is, I think, that Buridan clearly mentions his main difficulty with the view of Ockham and/or the Ockhamists, at least as he interprets their position.[54] In his eyes, it resides in their failure to distinguish clearly enough between the knowledge of natural phenomena, on the one hand, and of impossible things such as the void and chimeras, on the other.[55] For, if we should only possess scientific knowledge (by means) of negative and hypothetical, conditional propositions, we could indeed not distinguish between what is not (any longer, or not yet) there and what cannot be there, since in both cases the conditional propositions are true independent of the state of affairs of any time, with the result that our scientific knowledge of the ontology of the world would be extremely poor.[56]

53. Cf. the text quoted above, n. 30.
54. It should be remembered that Ockham himself also allows for propositions of the possible, see Guillelmus de Ockham, *Summa logicae* (Boehner e.a.), III-2, cap. 5, pp. $513^{64}$-$514^{2}$: Ex isto patet quomodo de contingentibus potest esse scientia; quia secundum quod veniunt in demonstrationem necessaria sunt, hoc est propositiones formatae de terminis importantibus talia contingentia quae veniunt in demonstrationem sunt necessariae, quae non sunt mere de praesenti et de inesse, categoricae et affirmativae, sed vel sunt negativae vel hypotheticae vel de possibili vel alio modo, vel aequivalentes eis.
55. See the text quoted above, n. 48.
56. In this context it is interesting to see how Buridan, in the discussion of Ockham's (or the Ockhamists') view of his *Ethics*-commentary, bundles together both the knowledge of "what is not there" and of "what cannot be there" and offers as examples both the knowledge of the vacuum and that of thunders; see Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum* (Paris, 1513), fol. $122^{va/rb}$: Ad hoc respondent aliqui quod sive de rebus existentibus sive non existentibus aut etiam impossibilibus existere contingit habere scientiam quoad propositiones que de his formari possunt perpetue veritatis ⟨sunt⟩, ita scilicet quod numquam possunt esse false. Dicunt ergo isti quod de his que non sunt etiam que nec esse possunt, possunt formari propositiones perpetue veritatis cathegorice, sed tamen negative. Ut quod vacuum nihil est, et ita scientiam habeo de vacuo negativam. ... Secundo isti dicunt quod de his que non sunt, possunt formari propositiones perpetue veritatis affirmative, sed tamen ypothetice. Ut "si vacuum est, ipsum est locus," vel "si tonitruum est, ipsum est sonus in nubibus." Cf. also fol. $123^{ra}$ where in the answer to the objections of the Ockhamists he clearly distinguishes between propositions as "aliquod animal fuit in archa Noë" and as "vacuum est locus non repletus corpore": Ad aliam quando dicitur quod in propositione affirmativa vera termini debent supponere pro eodem, concedo pro eodem presenti, preterito vel futuro. Sic

I must confess that I do not see how these similarities and divergences between the two redactions of our question could provide any clue for establishing a chronological order between them, nor is it possible, to my mind, to say anything about their respective chronological relation to the *Ethics*-commentary or to the *Summulae*. Note, however, that the redaction first discussed by us does not mention the natural supposition by name and speaks only of "that supposition, according to which the verb 'is' is taken indifferently for all the tenses" and might therefore be more in agreement with the *Summulae*, which emphasizes in the discussion of the natural supposition the omnitemporal, or even atemporal acceptance of the verb "is,"[57] even acknowledges that a proposition as "omne tonitruum est sonus factus in nubibus" is not true according to the property of speech (*de proprietate sermonis*),[58] and ends the discussion with the remark that some, using names conventionally, have called this supposition by the name of "natural supposition."[59]

The third question of Buridan's *Questions on De generatione et corruptione* discusses the problem of whether a word signifies the same irrespective of whether the thing signified exists or has passed away (*utrum vox significet idem, re existente et corrupta*).[60] Giles of Rome had touched upon this problem in the context of the question of whether, when something has passed away, there remains scientific knowledge of it, by presenting an explanation of how a noun signifies the same irrespective of whether the signified object has passed away or still exists.[61] Buridan, by contrast, devotes a separate question to this problem, thereby indicating the importance he attaches to this semantic problem in the context of the problem of our scientific knowledge of the natural world. The semantic issue of whether a word can lose its signification, so eagerly discussed in the late thirteenth century, find thus a new application, though

enim est verum dicere quod aliquod animal fuit in archa Noë, quia ibi tunc erat aliquod animal et ens in archa Noë. Et tamen concederem cum opinione predicta quod si termini propositionis vel alter eorum pro nullo supponerent neque presente neque preterito neque futuro, propositio cathegorica affirmativa non potest esse vera. Verbi gratia, hec est falsa "vacuum est locus non repletus corpore," si "vacuum" capiatur significative.

57. Cf. De Rijk, "The Development," pp. 52-57.
58. See Johannes Buridanus, *Summulae De suppositionibus* (Van der Lecq), p. $47^{5-18}$.
59. See *ibid.*, p. $49^{3-4}$: Haec sunt dicta de suppositione quam aliqui utentes nominibus ad placitum vocaverunt suppositionem naturalem.
It should be remembered that the reference at the end of the question in the *Ethics*-commentary to the discussion in the *Summulae* (see Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum* (Paris, 1513), fol. $123^{ra/rb}$) need not refer to the version of the *Summulae* as we have it.
60. In *Appendix* 2, I give the whole text of this question (*Appendix* 2 A the second(?) redaction, *Appendix* 2 B the Vatican-redaction); in my discussion, in which I will restrict myself mainly to the second redaction, I shall refer to the texts given in these *Appendices*.
61. See Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fol. $3^{rb-va}$: Primo declarandum est quod re corrupta idem significat nomen et re existente, ... .

Buridan himself gives us no indication that he was aware of the discussion and knew anything else than Giles of Rome's standpoint.[62]

The problem is illustrated by the exemplary question of whether in the complete absence, today, of roses or thunder, the words "rose" and "thunder" would continue to signify the same as yesterday when both items existed in abundance.[63] The arguments presented against a stable signification are based on the view that those words do not signify anything other than the concrete beings and in their absence would therefore lose their signification.[64] The counter-arguments state, first, that if such words ceased to signify the same, our speaking about that sort of things would be equivocal, so that there could be no scientific knowledge of them.[65] This argument is also invoked by Giles of Rome.[66] The second argument states that we can talk about people from the past and signify with their names the same persons as were signified during their lifetime.[67] As we will see, this is an argument employed by Buridan himself in his answer. By choosing these arguments, Buridan makes it clear that he wants to discuss the problem against the background of a view that relates signification principally to the concrete, individual things in reality.[68]

Buridan begins his answer by discussing a distinction — maintained notably by Giles of Rome[69] — according to which a word signifies both a concept (*conceptus*) and a conceived reality (*res concepta*). The concept is the formal significate, and the conceived object the material significate. And just as for the constitution of any being, both a formal and a material part are required, but in such a way that it remains identical to itself as long as its form remains the same, although its material part may change, so it also happens in the case of a word; there, the material aspect, the *res concepta(e)*, may change or even go out of existence, but the word will simply and absolutely remain the same as long as its formal aspect, the *conceptus*, remains stable.[70] But for Buridan, such a distinction cannot offer a solution, because, as he tries to show, the same argument *quod non* arises with respect to the concept as it does with regard to the noun. In fact, the arguments *quod sic* should not only demonstrate that our

62. For this discussion in the late thirteenth century, cf. in particular Ebbesen e.a., "Studies," Pinborg, "Bezeichnung," and Ebbesen, "Talking"; cf. also the contribution by Silvia Donati in this volume.
63. Cf. *Appendix* 2 A, p. $153^{6-8}$.
64. Cf. *Appendix* 2 A, p. $153^{9-17}$.
65. Cf. *Appendix* 2 A, p. $153^{18-22}$.
66. See Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fol. $3^{rb}$.
67. Cf. *Appendix* 2 A, p. $153^{23-25}$.
68. For this point in Buridan's semantics, cf. John Buridan, *Sophisms* (Scott), pp. 22-42 and Biard, *Logique et théorie*, pp. 180-185.
69. Cf. Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fol. $3^{va}$. In the Vatican-redaction, Buridan refers to Giles' view by name and he discusses it more extensively, cf. Appendix 2 B, p. $157^{17}$-$158^{7}$.
70. Cf. *Appendix* 2 A, p. $153^{26}$-$154^{18}$.

language concerns the same concept but that it concerns the same extramental entity.[71] Buridan claims that in a proposition such as "Aristotle was that person of whom Plato said 'Aristotle is a pupil of mine'," the word "Aristotle" supposits now for the same entity as it did when Plato uttered this sentence; but it is interesting to note that Buridan now invokes the notion of natural supposition, declaring that it is thanks to natural supposition that this proposition is true.[72] It should be borne in mind that Buridan does not reject the solution offered by Giles of Rome because he himself would not allow for the distinction between concept and thing in the signification of a word. The point is that for him, a (simple) concept is a concept only of individual entities in the same way in which a word signifies individual entities.[73]

In his own conclusions, which follow immediately upon these considerations, Buridan specifies that he speaks only of the ultimate signified, that is to say, of that for which the term supposits personally. He repeats the case imagined in the beginning of the question, where there exist no roses today, whereas there were many of them yesterday.[74] His first conclusion is that "there is nothing what the word 'rose' signifies" (*"nichil est quod hoc nomen 'rosa' significat"*). The reason is that "rose" does not signify anything other than a rose or roses — but there are currently none to be signified. It is also true that nothing is understood by the word "rose," since what is understood by a word is nothing other than what is signified by it. From this it follows that what the word "rose" signifies today is not the same as what it signified yesterday.[75] The second conclusion is: "the word 'rose' signifies something" (*"hoc nomen 'rosa' significat aliquid"*) and also "something is signified by the word 'rose'" (*"aliquid significat hoc nomen 'rosa'"*).[76] The truth of this statement follows from the fact that the word "rose" supposits for something, but a word can only supposit for something if

71. Cf. *Appendix* 2 A, p. $154^{19-27}$.
72. Cf. *Appendix* 2 A, p. $154^{27-31}$. It should be remembered that Buridan, when introducing the notion of natural supposition in his *Ethics*-commentary, gives also as his example the name of a historical person, see Johannes Buridanus, *Quaestiones super decem libros Ethicorum Aristotelis ad Nicomachum* (Paris, 1513), fol. $122^{vb}$: Videtur enim michi quod nomina que significant res nullum consignificando tempus determinatum, significant indifferenter res presentes, preteritas et futuras. Nec mirum, quia possum intelligere rem, nullum cointelligendo tempus determinatum. Unde possum apud intellectum componere inter conceptum rei et conceptum temporis, ita preteriti vel futuri sicut presentis, ut dicendo "Cesar fuit," "Cesar erit." Et ita non est inconveniens aliquando terminum supponere pro preteritis et futuris sicut pro presentibus. Duplex enim secundum antiquos logicos est termini communis suppositio, scilicet naturalis et accidentalis.
73. Cf. e.g. John Buridan, *Sophisms* (Scott), pp. 23-28.
74. Cf. *Appendix* 2 A, p. $154^{32-35}$.
75. Cf. *Appendix* 2 A, p. $154^{36}$-$155^{2}$.
76. Because the term "aliquid" is in the accusative form, I thought it best to translate the sentence in the passive form. It is to be noted that in the Vatican-redaction, Buridan uses himself the passive form in both conclusions, see *Appendix* 2 B, p. $158^{41}$-$159^{2}$: prima conclusio est quod nichil est quod nunc significatur per hoc nomen "rosa"; secunda conclusio ⟨est⟩ quod nunc aliquid significatur per hanc vocem "rosam."

it signifies it. That the word "rose" supposits for something today, although there are no longer any roses, follows from the fact that the proposition "the rose was a flower" is true, and an affirmative proposition can only be true, if the terms supposit for something. This is why propositions such as "a chimera was a chimera" or "a chimera is a chimera" are false, since their terms do not supposit for something. Also the name "Aristotle" supposits for something — namely for the philosopher who lived long ago — because if that name should not supposit for anything, the proposition "Aristotle was" would be no more true than the proposition "a chimera was."[77] Here we find Buridan pointing again to the difference there is, and should be, between propositions dealing with natural things that are inexistent at the moment and those that are inexistent because they cannot be. As we have seen above,[78] this difference is used against Ockham and/or the Ockhamists in Buridan's Vatican-redaction of the second question. In the imagined example, the word "rose" is significant, because I can say "I saw roses yesterday" and can thus form a concept of the roses I saw yesterday. To signify is in fact nothing else than to form a concept.[79] In order to explain his conclusions,[80] Buridan states that they are similar to these two: "there is nothing that can come to be anew" (*"nichil est quod de novo potest fieri"*), because everything that exists now cannot come to be any more, and "something can come to be anew, and will in fact even come to be" (*"aliquid potest de novo fieri, ymmo fiet de facto"*). The point here is that the proposition "something will in fact come to be" (*"de facto fiet aliquid"*) is true, whereas "there is something that will come to be" (*"aliquid est quod fiet"*) is false. For in the former proposition the verb, being of the future tense, exerts an ampliative force on the term "something," so that it supposits, not for present things, but for future things. In fact, the proposition states that some future thing will come to be. In the latter proposition, however, since there the term "something" is connected with a verb of the present tense, it is restricted to stand for present (or presently existing) things, so that the sense of the proposition must be that something presently existing will come to be; which is of course false.[81]

77. Cf. *Appendix* 2 A, p. 155[3-12].
78. Cf. *supra*, p. 142.
79. Cf. *Appendix* 2 A, p. 155[13-15].
80. Buridan states this only in such explicit words in the Vatican-version, see *Appendix 2 B*, p. 159[22-23]: Ad evidentiam dictarum rationum nota quod similiter possunt poni ille due conclusiones ... .
81. Cf. *Appendix* 2 A, p. 155[16-28]. In the Vatican-version, the discussion includes also the proposition "something is to be generated" ("aliquid est generandum"), see *Appendix 2 B*, p. 159[31-35]. For another discussion of similar propositions, cf. Johannes Buridanus, *Sophismata* (Scott), pp. 94-95 and in particular also pp. 97-99 (*cf.* John Buridan, *Sophisms* (Scott), pp. 149-150 and 152-155).

As Buridan returns to the problem at hand, he first states that such nouns — he seems to mean nouns we use to refer to natural things — signify in a timeless manner and that our natural concepts signify without time, so that a noun signifies not just presently existing objects, but indifferently present, past and future things. If this were not the case, it would not be true that thousand years ago there were horses and men and that in another thousand years there will still be horses and men.[82] Secondly, verbs such as "to understand" or "to signify" do not limit the entity being apprehended to the present, because we understand not only present things, but also past and future things. Because of this, these verbs exert an ampliative force on the terms they govern with the result that these terms can stand indifferently for present, past and future things. His conclusion is therefore that the word "rose" signifies the same — and he is careful enough to state explicitly that it signifies the same things (*easdem res*) — now, just as it has done for thousand years, irrespective of whether there are currently any roses or not.[83]

Buridan does not present an explanation for the similarity between the two pairs of conclusions he proposed at the beginning of his answer.[84] The point is, however, not difficult to grasp. "There is nothing that the word 'rose' signifies"

*"nichil est quod hoc nomen 'rosa' significat"*;

and "there is nothing that can come to be anew"

*"nichil est quod de novo potest fieri"*;

are both true, because their respective contradictories are false, that is, "there is something (presently existing) that the word 'rose' signifies"

*"aliquid est quod hoc nomen 'rosa' significat"*;

and "there is something (presently existing) that will come to be"

*"aliquid est quod fiet"*.

The latter statement is wrong, because anything that already exists cannot come to be anew; while the former is wrong, because in the case posited there happens to be no rose presently existing. On the other hand, "the word 'rose' signifies something"

*"hoc nomen 'rosa' significat aliquid"*;

and also "something is signified by the word 'rose'"

*"aliquid significat hoc nomen 'rosa'"*;

are both as true as "something will come to be"

*"aliquid fiet"*.

For just as in this last statement, the term "something" is ampliated to the future by the future tense of the verb — so that in truth it indicates that something future

82. Cf. *Appendix* 2 A, p. $155^{29-34}$.
83. Cf. *Appendix* 2 A, p. $155^{35-42}$.
84. He does so, however, in the Vatican-version, cf. *Appendix* 2 B, p. $160^{27-33}$.

will come to be —, so in the former case the term "something" is ampliated to the past (or to the future) by the verb "to signify" — so that in fact it indicates that something past (*in casu* yesterday's roses) or future is referred to by the word "rose."

For such an ampliation to be possible, the signified should be able to encompass all three time relations (or tenses) and should in itself not be restricted to any one of them. Further, there should be something which makes the term to stand in fact for, or to supposit for, more than the present(ly existing) things only; next to the past and future tense of the predicate-verb this can be a verb like "to understand" and "to signify." Interestingly, Buridan, either implicitly (in the version discussed here) or explicitly (in the Vatican-version), presents the ampliation exerted by the tenses of the predicate-verb as an explanation for the ampliation exerted by the verb "to signify." He seems to be assuming that the first form of ampliation, which is in fact found also in the traditional handbooks of logic,[85] is better known to his students (or readers) than the second form. Perhaps this contains an indication of Buridan's own line of thought as it developed in connection with his rejection of the simple supposition.[86]

Buridan ends his discussion[87] with the remark that every word signifies something — and again he is careful enough to state explicitly that it signifies some things (*aliquas res*) — be it present, past, or future, as they would otherwise be no more conventionally significant than words like "boff" or "baff." If it is asked what a word like "vacuum" or "chimera" signifies, as there are no such things as a vacuum or a chimera, he answers that what is signified is indicated by their nominal definitions, that is, in the case of the term "vacuum," of which the nominal definition is "a place not filled with a body," it signifies all the places and all the bodies of this world.[88]

85. Cf. e.g. Petrus Hispanus Portugalensis, *Tractatus* (De Rijk), pp. 194-196.
86. For an explicit view that terms related to verbs signifying an activity of the mind — like "to know" — have simple supposition, see the *Dialectica Monacensis* (*Logica Modernorum* (De Rijk), II, 2), p. 611, 37ff.: Et notandum quod verba significantia actus anime, ut *"scio," "cogito," "pono,"* et similia, secundum illos actus simpliciter respiciunt illos terminos respectu quorum sumuntur. ... Cf. also the reference to such a view found in the *Summe Metenses* (*ibid.* II, 1), p. 455: Notetur quod dicunt alii quod quando ponitur (*scil.* terminus communis *HB*) cum verbo significante actum mentis vel cum est ibi predicatum rationis, tenetur simplicitr. Ut cum dicitur: *"homo est species," "homo intelligitur."* It is to be noted, however, that the author of the *Summe* himself already supports the view that verbs like "to understand" have ampliative force, cf. *ibid.*, p. 459: *"non habenti vim ampliandi"* dicitur ad removendum verba ampliantia que sunt: *"potest," "laudatur," "intelligitur,"* et similia. ... Similiter cum dico: "Cesar laudatur," si id verbum *"laudatur"* ratione presentialitatis teneatur, locutio est falsa, cum Cesar sit non-ens. Quare hec verba et similia ampliare dicuntur, ut *"intelligitur."*
87. That is in the version under discussion; in the Vatican-version this part cannot be found. There Buridan ends by making distinctions regarding the question discussed and discussing the arguments *quod non*; cf. *Appendix 2 B*, p. $160^{34}$-$161^{17}$.
88. Cf. *Appendix* 2 A, p. $155^{42}$-$156^{15}$.

Not least because of this last item, our question bears a strong resemblance to Buridan's *Questiones longe super librum Perihermeneias* I, qu. 2: *utrum omne nomen significat aliquid*.[89] After having stated without further ado that every word that forms part of a certain language is conventionally significant, Buridan there also discusses the problem of the signification of words like "chimera" and of the word "rose" in case there are no more roses.[90] And as in our questions and elsewhere, here, too, these two cases are connected in his discussion, though at the same time clearly distinguished. The discussion of words like "chimera" is here more elaborate than in our question. He introduces the notion of a complex concept, as *homo albus* or *asinus rationalis*, so as to explain that sometimes a word connected with such a complex concept, though it signifies the things that correspond to the simple concepts of which the complex concept is composed, does in fact not supposit for anything, because there exists no thing in reality that corresponds to the complex concept, just as nothing corresponds to "vacuum" or "chimera."[91] The problem of the word "rose" in a world in which there are no roses is discussed in a similar way to the one we encountered in our question. Because the word "rose" corresponds to a simple concept, it cannot signify other things than roses, and hence it must supposit for roses. If, however, there are no roses at the moment, it has to signify and to supposit for roses that were earlier. Buridan espouses here the same conclusions as in our question, to the effect that a rose is signified by the word "rose," although there is no such thing as a rose (presently existing) (*rosa significatur per hoc nomen "rosa" quamvis etiam nulla sit rosa*);[92] that the word "rose" supposits for roses, although there is no rose at the moment; that it therefore supposits for the roses of the past (*hoc nomen "rosa" supponit pro rosa et hoc nomen "rose" pro rosis, licet nulla sit rosa*);[93] and that there is nothing that the word "rose" signifies and for which it supposits (*nichil est quod hoc nomen "rosa" significat ultra conceptum et nichil est pro quo hoc nomen "rosa" supponit*).[94] The discussion ends here, as also in our question, with the statements that nouns signify without difference of time and that verbs like "to understand," "to know," and "to signify" exert an ampliative force on the terms over which they reign so that these may supposit indifferently for present, past, and future and for all possible things.[95]

89. Cf. Johannes Buridanus, *Questiones longe super librum Perihermeneias* (Van der Lecq), pp. $7^{28}$-$14^{38}$.
90. Cf. also the discussion of that question by the editor in her Introduction, *ibid.*, pp. XXI-XXVIII.
91. The same can be found also in Johannes Buridanus, *Questiones Elencorum* (Van der Lecq e.a.), qu. 17: *Utrum chymera sit intelligibilis*, pp. 84-86. For a discussion of Buridan's view on chimeras in its historical context, cf. Ebbesen, "The Chimera's Diary," pp. 135-140.
92. Cf. Johannes Buridanus, *Questiones longe super librum Perihermeneias* (Van der Lecq), p. 12, 19ff. (tertia conclusio).
93. *Ibid.*, p. 13, 6ff. (quarta conclusio).
94. *Ibid.*, p. 13, 13ff. (quinta conclusio).
95. *Ibid.*, p. 14, 10ff.

As we have seen, in his first three *Questions on De generatione et corruptione*, Buridan formulates a number of positions that can also be found in some other works of his and which here assume the character of an introductory discussion of the possibility of scientific knowledge about things that come into being and pass away. One of the salient points in his discussion consists in the emphasis with which he underlines that scientific knowledge does not only concern conclusions or propositions in general, but above all the very things that are signified by the terms these conclusions consist of. Among the other general points, we may also count his claim that nouns signify without temporal restriction or in his belief that verbs like "to understand," "to know," and "to signify," ampliate the terms they govern in such a way that these may stand generally for present, past, future, and possible things.

It might thus seem as if these questions only provided just another instance of Buridan's views on scientific knowledge and on the way in which it should be expressed. But there are some points that are formulated more poignantly in our questions than elsewhere or have a somewhat different character. First of all, there is a greater emphasis on what appears to constitute the main point against the Ockamist view on scientific knowledge, with Buridan arguing that if we possessed only negative and conditional knowledge, we could not distinguish clearly enough between our knowledge of phenomena of nature and that of impossible things. In his three questions, Buridan also seems to be rather reticent about the natural supposition. In one of the two extant redactions, he does not mention it by name and only speaks of "that supposition," while in the other, he mentions it by name, but leaves it open whether he endorses it. Seen in this light, we should perhaps attach less importance to the role played by natural supposition in the well-known question VI, 6 of the *Ethics*-commentary, but instead pay more attention to the rather detached manner in which Buridan speaks about this matter in his *Summulae*. Unfortunately, our present state of knowledge does not allow us to decide whether the unclear status accorded to natural supposition in our questions points to a doctrinal development in Buridan's thought regarding this issue.

However this be, these points make clear, I think, that these three questions shed an interesting new light on Buridan's views. Most important seems to be the placement of these question at the beginning of his commentary, which clearly attests to the importance Buridan attaches to the semantic aspects of the problem of scientific knowledge and to the role a correct analysis of propositions expressing such knowledge should, according to him, play in our true understanding of our world.

# Appendix 1

List of questions of Johannes Buridanus, Questiones *in libros De generatione et corruptione* (second redaction?)[96]

Book I

1. Utrum de generabilibus et corruptibilibus sit scientia.
2. Utrum ad corruptionem rerum corruptibilium corrumpatur scientia de eis, supposito quod de eis habeatur scientia.
3. Utrum vox significet idem, re existente et re corrupta.
4. Utrum si impossibile est elementa generari substantialiter, impossibile est ea alterari.
5. Utrum corpus sit divisibile secundum quodlibet signum eius et secundum quodlibet punctum eius.
6. Utrum possibile sit aliquid simpliciter generari.
7. Utrum omnis generatio unius sit corruptio alterius.
8. Utrum in animato sit alia forma substantialis ab anima.
9. Utrum omnis generatio differat ab alteratione.
10. Utrum illa descriptio generationis est bona in qua dicitur "generatio est transmutatio totius in totum non manente aliquo sensibili ut subiecto eodem."
11. Utrum rarefactio sit proprie augmentatio.
12. Utrum in augmentatione viventis cibus augeatur vel corpus animatum.
13. Utrum illud quod augetur maneat simpliciter idem ante et post.
14. Utrum eius quod augeatur quelibet pars augeatur.
15. Utrum augmentatio fiat per partes formales et non secundum partes materiales.
16. Utrum augmentatio sit motus proprie dictus distinctus a motu locali, a generatione substantiali, et ab alteratione.
17. Utrum omne animatum quamdiu vivit nutriatur sed non quamdiu vivit augeatur.
18. Utrum omne agens in aliquod passum tangat ipsum.
19. Utrum omne agens agendo repatiatur et omne passum patiendo reagat.
20. Utrum possibile sit esse actionem a proportione equalitatis vel etiam inequalitatis.
21. Utrum forme substantiales elementorum suscipiant magis et minus.

**96.** For this list of questions as compared to those of other fourteenth century commentaries, cf. also Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), pp. 69*-77*.

22. Utrum forme substantiales elementorum maneant in mixto.
23. Utrum mixtio sit possibilis.
24. Utrum quod est simpliciter corruptum possit reverti idem numero.[97]

## Book II

1. Utrum tantum sint quatuor qualitates prime, scilicet calidum, frigidum, humidum, siccum, sive caliditas, humiditas, frigiditas, siccitas, ita quod hic non fiat differentia inter concreta et abstracta.
2. Utrum quatuor primarum qualitatum due sunt active, scilicet calidum et frigidum, et due passive, scilicet humidum et siccum.
3. Utrum sint quatuor elementa et non plura.
4. Utrum ignis sit continuus aque et aer terre.
5. Utrum aqua est primo frigida.
6. Utrum caliditas aeris et caliditas ignis sunt eiusdem rationis sive eiusdem speciei differentes solum secundum intensionem et remissionem.
7. Utrum qualitas symbola maneat eadem in generato que fuit in corrupto.
8. Utrum elementa habentia symbolum facilius et citius transmutentur ad invicem quam non habentia symbolum.
9. Utrum quelibet duo elementa non habentia symbolum possunt transmutari in quodlibet tertium et quod habentia symbolum non possunt sic transmutari ad tertium.
10. Utrum omne mixtum quod est circa medium locum sit compositum ex omnibus simplicibus.
11. Utrum possibile sit esse aliquod mixtum simpliciter et perfecte temperatum.
12. Utrum calidum, frigidum, humidum et siccum, idest quatuor prime qualitates, sint principalia agentia in generatione mixtorum.
13. Utrum sint generationes et corruptiones perpetue.
14. Utrum possint perpetuari in hoc mundo generationes et corruptiones, si non essent plures motus celestes.[98]

**97.** For this question and a presentation of its content, cf. Braakhuis, "John Buridan."

**98.** If one compares this list of questions with that of the other (earlier?) version, which I have called the Vatican redaction, of which the text is found in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fols. 103$^{ra}$-145vb and partially also in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2185, fols. 40-61 and of which the list of questions is found also in MS Cesena, Biblioteca Malatestiana, S. VIII. 5, fol. 3(4)$^{ra-vb}$, and of which the list of questions as they occur in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097 is presented in Maier, "Verschollene Aristoteleskommentare," pp. 257-259 and the list as it occurs in MS Cesena, Biblioteca Malatestiana, S. VIII. 5 in Thijssen, "Buridan," pp. 73-75, then it appears that the questions book I, 8, 10, 13, 15, 19 and 20 and book II, 3, 7 and 9 as listed above are missing in that Vatican version, and that qu. I, 17 is missing in the Cesena list, but is found as qu. I, 18 in MS Vat. lat. 3097. For a comparison of the questions of the two Vatican MSS and the Cesena MS, cf. Michael, *Johannes Buridan*, II, pp. 642-646.

# Appendix 2 A

Johannes Buridanus, *Questiones in libros De generatione et corruptione* (second redaction?)

⟨Questio I, 3: Utrum vox significet idem, re existente et corrupta.⟩[99]

Questio tertia est talis utrum vox significet idem, re existente et corrupta. 125$^{rb}$

Et ponamus exemplum quod heri erant multe rose et modo nulla sit rosa, vel quod heri fuerunt multa tonitrua et nunc non sint tonitrua; tunc est questio utrum ista nomina "rosa" "tonitrua" significent idem nunc quod heri significabant.

Et arguitur quod non:

Hoc nomen "rosa" non significat michi nisi rosam vel rosas, et tamen rosa nichil est, per casum positum; ergo nichil est quod hoc nomen "rosa" significet; sed quod nichil est nulli est idem; igitur non est idem quod "rosa" nunc significat et quod heri significabat.

Secundo. Rosa existente, hoc nomen "rosa" significat aliquid et, nulla existente, hoc nomen "rosa" nichil significat, quia non significat nisi rosas, que nichil sunt; modo aliquid et nichil non sunt idem; ergo vox non significat idem, re existente et ipsa corrupta.

Oppositum videtur argui breviter, quia: si hoc nomen "tonitruum" non significaret idem, tonitruo existente et tonitruo non existente, sequeretur quod equivocat locutio de tonitruis, quando tonitrua essent et quando non essent, et periret scientia libri *Metheorum* statim per fallaciam equivocationis, quando tonitrua cessarent. Quod est falsum et etiam inconveniens dicere.

Item. De illo eodem loquor, si dico "Aristotiles fuit," de quo loquebatur ille qui dixit "Aristotiles est," Aristotile existente; igitur [nunc] hec vox "Aristotiles" nunc significat illud quod significabat, scilicet quando Aristotiles erat.

Aliqui expositores intendunt solvere istam questionem distinguendo de significato vocis, quoniam res extra, ut dicunt, significatur per vocem mediante conceptu, et per vocem significantur quodammodo conceptus | et aliquo 125$^{va}$ modo res concepte, ut rosa vel tonitruum. Et ulterius dicunt quod intellectus est tamquam significatum formale, sed postea dicunt quod res concepta est

**99.** The following edition aims simply at presenting the content of the text and does not have any critical aim; so I have refrained from giving variant readings. The manuscript I have used is MS Kraków, Biblioteka Jagiellonska, cod. 751, fols. 124$^{ra}$-147$^{rb}$. I have consulted, however, also MS Berlin, Staatsbibliothek, Preußischer Kulturbesitz, lat. fol. 387, fols. 129$^{ra}$-156$^{vb}$, MS Erfurt, Wissenschaftliche Allgemeinbibliothek, cod. Amplon. F. 357, fols. 96$^{ra}$-129$^{va}$, MS Kraków, Biblioteka Jagiellonska, cod. 654, fols. 80$^{va}$-82$^{va}$ and MS Wien, Österreichische Nationalbibliothek, Cod. lat. 5453, fols. 30$^{ra}$-48$^{va}$. For a description of the MSS, cf. Michael, *Johannes Buridan*, II, pp. 631-648. The corrections I have made to the text as presented in MS Kraków, B. J. 751 are based on these other MSS.

tamquam significatum materiale. Et tunc dicunt ulterius quod quandocumque(?) ad esse alicuius concurrunt duo, unum sicud formale, aliud sicud materiale, illud dicitur manere idem, si formale maneat idem, quamvis materiale mutetur. Et ponunt exemplum quod animal, quod mutatur continue, dicitur permanere idem animal, quia partes formales manent, licet partes materiales fluunt et refluunt, ut Aristotiles primo huius. Et ponunt secundum exemplum de loco; et dicunt quod ad locum concurrunt duo, unum scilicet superficies corporis continentis, que est sicud materiale, aliud est tanta distantia ad orbem vel ad res quiescentes, que est sicud formale. Modo locus dicitur manere idem, si maneat tanta distantia, quamvis superficies continue mutetur. Verbi gratia: arbor in campo, quando ventus flat, tunc continue aër continens arborem mutatur et fit alius et alius, et tamen nos dicimus arborem continue manere in uno loco, quia manet in eadem distantia ad orbem. Hoc notato, dicunt ipsi quod vox, puta hoc nomen "rosa," quantum ad significatum formale, scilicet quantum ad conceptum, significat idem, rebus existentibus et non existentibus, quia potest manere idem conceptus, tamen quantum ad significatum materiale non significat idem. Et sequitur ex dictis quod simpliciter et absoluto sermone debent concedere quod vox significet idem, re existente et corrupta.

Sed ego credo quod illa dicta non solvunt questionem, sed quod querebamus de nomine, nunc queramus de conceptu, scilicet utrum per hoc nomen "rosa" ego concipio idem, rosa existente et non existente. Et arguam sicud prius, quia isto conceptu non concipio nisi rosas, que non sunt eedem quando sunt et quando non sunt, quia quod nichil est nulli est idem. Sed ego probo oppositum sicud prius, quia de eadem re, non quantum ad conceptum sed etiam ad rem extra, ego loquor, cum dico "Aristotiles fuit," de qua loquebatur dominus Aristotilis, idest quando Aristotiles erat; et non loquor de eadem re nisi quia eandem re⟨m⟩ concipio. Item. Veniendo ad vocem et capiendo eam secundum suppositionem naturalem, hec est vera "Aristotiles fuit idem de quo Plato dicebat 'Aristotiles est scolaris meus'." Igitur apparet quod hec vox "Aristotiles" pro eadem re extra supponit nunc pro qua supponebat tunc. Quod non esset verum, nisi significaret idem nunc quod significabat tunc.

Et ideo breviter pono faciliter duas conclusiones. Et intendo solum loqui de significato ultimato, scilicet pro quo terminus supponit personaliter. Et pono casum sicud prius ponebatur, scilicet quod heri essent rose et modo nulle, sicut tunc.

Est prima conclusio quod nichil est quod hoc nomen "rosa" significat. Probatur, quia: hoc nomen "rosa" significat nisi rosam vel rosas, et nichil aliud, sicud prius dictum est, et tamen nichil est rosa, per casum; ideo nichil est quod hoc nomen "rosa" significat. Et eodem modo dico quod nichil est quod per hoc nomen "rosa" intelligitur, quia non intelligitur per hoc nomen "rosa" nisi quod per hoc nomen "rosa" significatur. Quod suppono(?) ita esse, et secundum quod

ita est, sequitur quod non est idem quod hoc nomen "rosa" nunc significat et quod prius significabat, quia quod nichil est, nulli est idem.

Secunda conclusio: hoc nomen "rosa" significat aliquid, et aliquid etiam significat hoc nomen "rosa." Probatur, quia: hoc nomen "rosa" pro aliquo supponit, et tamen pro illo non supponeret, nisi ipsum [non] significaret.

Et hoc probo, scilicet quod pro aliquo supponit, quia: verum est dicere "rosa fuit flos," et tamen talis propositio affirmativa non est vera, nisi terminus pro aliquo supponit. Unde hec est falsa "chymera fuit chymera," similiter et hec "chymera est chymera," propter hoc quod terminus pro nullo supponit.

Item. Sicud prius arguebatur, si ista vox "Aristotiles" pro nullo supponeret, tunc ista propositio "Aristotiles fuit" non esset plus vera quam illa "chymera fuit."

Item. Cum dico "rosas vidi heri," per hoc nomen "rosa" formatur ⟨michi conceptus rerum⟩ quas vidi heri; igitur hoc nomen significat rosas; illas res tamen significat, quia significare non est aliud quam conceptus rei constituere.

Et debetur scire quod iste conclusiones iam posite sunt virtute similes duabus conclusionibus istis:

Quarum prima est: nichil est quod de novo potest fieri, quia quicquid modo est, illud non potest amplius fieri; igitur nichil est quod potest fieri.

Secunda conclusio de illis duabus est quod aliquid potest de novo fieri, ymmo fiet de facto. Unde | hec est vera "de facto fiet aliquid," tamen hec est falsa "aliquid est quod fiet." Quia cum dico "aliquid est quod fiet," illud verbum "fiet" non potest ampliare hoc nomen "aliquid" ad futura, quia ly "aliquid" per hoc verbum "est" sibi adiunctum restringitur ad presentia. Sed quando dico "aliquid fiet," tunc hoc verbum "fiet," quia est futuri temporis, ampliat hoc nomen "aliquid" ad supponendum pro futuris. Et ideo hec est vera "aliquid fiet," et hoc nomen "aliquid" supponit ibi pro rebus ⟨non⟩ que sunt sed que erunt. 125vb

Deinde ad propositum revertendo debet⟨ur⟩ scire quod ista nomina sunt significantia sine tempore et etiam conceptus naturales significant sine tempore, ita quod in conceptu naturali nulla differentia temporis concipitur. Et ideo nomen non solum significa[n]t presens, ymmo indifferenter presentia, preterita et futura. Aliter enim non esset verum quod ante mille annos erant homines et equi et quod plus mille annos erunt homines et equi.

Item. Debetur scire quod ista verba "intelligere," "significare" et huiusmodi non determinant sibi presens circa rem apprehensam, quia possumus intelligere non solum rem presentem sed preteritam et futuram. Et propter hoc predicta verba habent naturam ampliandi terminos quos regunt ad supponendum indifferenter pro presentibus, preteritis et futuris. Et ideo hoc nomen "rosa" easdem res modo significat quas significavit ante mille annos, sive modo sint rose sive non, quia et nunc et tunc hoc nomen "rosa" indifferenter omnes rosas presentes, preteritas et futuras significavit. Ymmo, quod plus est, ego credo quod omne

nomen significat aliquas res, scilicet aut presentes aut preteritas aut futuras, quia si nichil significaret, non esset vox significativa ad placitum plus quam "bu" vel "ba."

Sed tu quereres quid igitur significat hoc nomen "vacuum" vel hoc nomen "chymera," cum nichil sit vacuum vel chymera.

Respondetur quod tu videbis quas res significant, si explicamus diffinitiones illarum dicentes quid nominis, quia illa nomina nichil significant quin diffinitiones illarum. Modo diffinitio vacui est: *locus non repletus corpore*, et hec diffinitio significat indifferenter omnia loca mundi, propter hoc quod hoc nomen "locus" ponitur in ea. Vel etiam significat omnia corpora mundi, propter hoc quod iste terminus "corpus" ponitur in ea. Et ideo plures res significat hoc nomen "vacuum." Ita etiam si describitur chymera, quia chymera est: *animal compositum ex partibus incompossibilibus ad invicem*, ut ex capite equi et corpore hominis. Modo illa diffinitio significat omne animal, propter hoc nomen "animal," et omnia composita, propter hoc nomen "compositum."

Istis visis, apparet quod rationes que fiebant in principio questionis, procedunt viis suis.

Et patet questio.

## Appendix 2 B

Johannes Buridanus, *Questiones in libros De generatione et corruptione* (Vatican redaction)[100]

⟨Questio I, 1: Utrum vox significet idem, re existente et non existente.⟩[101]

103$^{va}$ Primo queritur utrum vox significet idem re existente et non existente.

Ponamus exemplum de hoc nomine "rosa," posito quod in estate sunt rose, in hyeme nulle, utrum hoc nomen "rosa" significet idem in hyeme et estate.

Arguitur quod non, quia: vox illa significat rem aliquam; sed illa res non est eadem, ipsa existente et non existente, quia ipsa non existente nichil est, et si nichil est, non est eadem.

Item. Re existente vox significat aliquid, quia illa res tunc est aliquid; sed, re non existente, vox nichil significat; sed nichil et aliquid non sunt idem; ergo non significat idem. Minor probatur, quia: vox non significat aliud quam talem

**100.** For this redaction, cf. above, nn. 41 and 98.

**101.** I have used MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fols. 103$^{ra}$-145$^{vb}$. I have used also MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2185, fols. 50$^{ra}$-51$^{va}$, where are found the two questions that are explicitly ascribed to Buridan, cf. Maier, *Codices Vaticani Latini*, pp. 196-197. Since, however, the two texts differ in quite some details, I have noted only the more interesting readings of MS Vat. lat. 2185.

rem, adhuc hec vox "rosa" non significat aliud quam rosam; sed tunc rosa nichil est; ergo nichil significat etc.

Oppositum arguitur, quia: si vox non significaret idem, re existente et non existente, sequeretur quod vox indigeret cottidie nova impositione ad significandum. Falsitas patet de se. Consequentia probatur, quia: tu dicis quod hec vox "rosa" non significat nisi rosas que modo sunt, quia si diceres quod significat omnes presentes, preteritas et futuras, significaret omnes. Alii ponunt quod non significat nisi rosas presentes; et tamen aliquando significabit futuras; ideo videtur quod hoc sit per novam impositionem.

Item. Sequeretur quod, tonitruis existentibus et postea non existentibus vel eclipsibus, scientia nostra, quam habemus de tonitruis, esset tota secundum equivocationem. Falsitas patet, quia tunc non esset vera scientia sed magis deceptio et fallacia communiter, quia non habemus illam scientiam nisi mediantibus vocibus significativis, et ille non significant idem quod prius sed aliud; ideo est ibi equivocatio. Ergo oportet dicere quod voces significent idem, re existente et non existente.

Sciendum ⟨quod⟩ Egidius vult solvere hanc questionem, prenotando quod voces habent duplex significatum, scilicet materiale et formale. Materiale est ipsa res extra, scilicet lapis, homo, asinus etc., et loquor hic de vocibus significantibus res extra ⟨vel⟩ entia naturalia, non curando nunc de intentionibus. Significatum formale est | est conceptus ille mediante quo illa res extra imponitur 103$^{vb}$ ad significandum, quia impossibile est quod aliqua res imponitur ad significandum per vocem, nisi ipsa sit concepta et intellecta. Quod autem vox habeat illud duplex significatum patet in libro *Peryarmenias*, quia illa vox "homo" significat homines et "lapis" lapides, significant etiam conceptus anime; ideo ibidem dicitur: "voces sunt note, idest signa, earum passionum que sunt in anima." Hoc prenotato ponit tres conclusiones. Prima est quod quantum ad significatum materiale vox non significat idem, re existente et non existente; et hoc probant rationes que prius sunt facte. Secunda conclusio est quod voces significant idem, re existente et non existente, quantum ad significatum formale, quia ille voces significant idem quantum ad significatum formale, que eundem seu consimilem conceptum constituunt sive res sit sive non sit; voces huiusmodi igitur etc. Et nota ex dictis quod talem conceptum vocabamus significatum formale, videlicet quia, si aliquis proponit tibi hoc nomen "rosa," eundem conceptum habebis, sive multe rose sint in Roma sive non sive si non sint alique. Tertia conclusio est sua quod simpliciter et absoluto sermone dicendum est quod voces significant idem, re existente et non existente. Ratio quia: omne illud quod constituitur ex materiali et formali dicitur simpliciter manere idem, si maneat idem formale, quantumque materiale diversificatur; sed in proposito dictum est quod formale manet sed materiale diversificatur; ergo simpliciter dico quod manet idem. Maior probatur, quia: a formali fit denominatio simpliciter et non a materiali, ut patet, quia locus importat duo: importat materialiter superficiem corporis

continentis et importat formaliter tantam distantiam ad orbem. Arbor in campo dicitur continue manere in eodem loco, licet aër continens, qui est materiale in loco, diversificatur, tamen quia formale, scilicet distantia ad orbem, manet, ideo dicitur manere idem locus simpliciter. Item. Animal dicitur manere idem in numero continue, licet partes materiales fluant et refluant continue, ut patet in primo huius, ideo etc. Sed minor rationis patuit ex duabus conclusionibus precedentibus. Hec est opinio Egidii.

Sed videtur mihi quod hec opinio est dubitabilis et falsa.

Primo quia illa exempla de loco et de animali sunt multum dubitabilia; tamen de illis non pertinet hic tractare.

Item est dubitabilis opinio, quia ibi manet tanta dubitatio post illam solutionem sicut ante. Quia ego non queram de voce, sed queram de conceptu, scilicet quando ego concipio rosam, si proponas mihi hoc nomen "rosa," utrum concipio idem, rosa existente vel non existente, vel utrum non idem concipiam. Et propono tibi utramque partem. Primo quod non concipio idem, quia non concipio nisi rosam veram, quia quando concipio rem extra, non concipio conceptum; modo rosa non est eadem, ipsa existente et non existente. Propono tibi quod concipio idem, quia quando concipio rosam, quero si concipiam solam vocem vel solummodo conceptum anime vel rem extra. Non poteris dicere quod vocem vel conceptum solum, quia iste terminus "rosa" non supponit pro eis, nisi accipiatur materialiter vel simpliciter; ideo oportet quod intelligam aliud quam vocem vel conceptum. Modo si intelligo aliud, vel intelligo solummodo
104ra rosas | presentes vel cum hoc intelligo rosas preteritas et futuras. Si dicis quod rosa presentes tantum intelligo, contra, quia: tunc non posse⟨m⟩ dicere vere quod anno preterito fuerunt multe rose vel quod anno futuro erunt multe; ideo concepi preteritas et etiam futuras; et ideo concipio easdem quas anno preterito concepi, quia concipio illas que tunc erant presentes ut preteritas.

Item. Concludo quod sua conclusio prima est falsa, in qua dicit quod vox non significat idem, re existente et non existente, quantum ad significatum materiale. Propono positum quod heri fuerunt tonitrua et modo nulla sunt tonitrua et quod heri tu diceres "ego audio tonitrua" et nunc dicas "ego heri audivi tonitrua." Peto utrum loqueris modo de eisdem tonitruis vel de aliis. Et certum est quod de eisdem, quia non loqueris nisi de tonitruis que fuerunt heri, et heri de eisdem dicebas "ego audio tonitrua"; quod (quia *MS*) non esset verum nisi hoc nomen "tonitruum" significaret idem quod heri. Confirmatur: illud nomen significat pro quo supponit, et accipiatur sine multiplicitate(?); sed hoc nomen "tonitruum" nunc et heri supponit pro eodem; ergo idem significat. Maior nota. Minor patet, quia: heri, quando dicebas "ego audio tonitrua," et modo, ⟨quando⟩ dicis "ego audivi heri tonitrua," supponit pro eisdem; igitur etc.

Ideo pono conclusiones logicales, quia difficultas est hec ex ignorantia logice. Posito quod prius fuerunt multe rose et modo nulla est, vel tonitrua, prima

conclusio est quod nichil est quod nunc significatur per hoc nomen "rosa"; secunda conclusio ⟨est⟩ quod nunc aliquid significatur per hanc vocem "rosam."

Prima conclusio probatur, quia: per hoc nomen "rosa" nichil significatur aliud a rosa, et dico ad extra, non loquendo de conceptu sed de significato ad extra, pro quo terminus personaliter supponit; sed rosa nichil est vel nichil est rosa; ideo nichil est quod significatur per hoc nomen "rosa." Maior nota, loquendo de significato materiali secundum Egidium ad extra. Minor patet in casu posito. Ergo nichil est quod significatur per istum terminum "rosa."

Secunda conclusio: quod aliquid significatur per hoc nomen "rosa," quia pro aliquo supponit ille terminus "rosa"; ergo aliquid significatur per ipsum. Consequentia nota est de se, quia tales termini specialiter speciales(?) non supponunt nisi pro eo quod significant, cum non sint connotativi. Minor probatur, quia: aliter non esset vera "rosa fuit rubra," quia propositio affirmativa non habet veritatem nisi ex eo quod termini supponunt pro eodem, et tamen illa est vera "rosa fuit rubra," et ideo supponunt pro eodem, et per consequens pro aliquo. Item. Si ille terminus "rosa" pro nullo supponeret, sequeretur quod non esset differentia inter illum terminum "rosa" et illum terminum "chymera," quia unum non magis supponeret pro aliquo quam reliquum. Consequens est falsum, quia ex eo quod ille terminus "chymera" ⟨pro nullo⟩ supponit, posssumus vere dicere quod nec chymera est nec fuit nec erit. Hoc autem non possumus dicere de rosa; ideo pro aliquo supponit et aliquid significat.

Ad evidentiam dictarum rationum nota quod similiter possunt poni ille due conclusiones "nichil est quod potest produci de non esse ad esse," quia de omni eo quod est aliquid, falsum est dicere quod amplius potest produci de non esse ad esse. Patet inductive de singulis. Et tamen illa | est vera "aliquid potest produci 104rb de non esse ad esse." quia sua contradictoria est falsa, scilicet "nichil potest produci de non esse ad esse." Solvatur contradictio apparens in istis duabus ultimis conclusionibus, et erit solutum in proposito.

Dico ergo quod illi termini qui significant vel connotant futurum aut preteritum, trahunt terminos non solum ad supponendum pro presentibus sed pro futuris. Similiter ⟨quando⟩ dico "aliquid est generandum," ille terminus "aliquid" non solum supponit pro presentibus sed pro futuris, quia ille terminus "generandum" est futuri temporis. Ideo dicendo "aliquid est generandum," non est sensus: *aliquid quod est, est generandum*, sed sensus est: *aliquid quod erit, est generandum*. Similiter dico de hac "aliquid est corruptum." Modo iste terminus "potest" habet respectum ad futurum, quia potentia ⟨est⟩ ad actum(?) futurum. Ideo ille terminus "potest" trahit terminum ad supponendum non solum pro presentibus sed etiam pro futuris. Ex quo patet quare iste conclusiones possunt simul stare "nichil est quod potest produci *etc.*" Sciendum ⟨quod⟩ in hac dictione "nichil" includitur hoc nomen "aliquid" cum negatione, "nichil," idest:

32–33 quia ille terminus "generandum"] *MS 2185* similiter *MS 3097*.

*non aliquid*. Modo [ille terminus "nichil" vel "non aliquid" additur isti termino "est," quod est presentis temporis. Ideo] in hac propositione "nichil est quod potest produci *etc*." huic termino "nichil" vel "non aliquid" additur hoc verbum "est," quod est presentis temporis. Unde hoc verbum "potest," quod sequitur, non construitur cum hac "nichil" sed cum "quod"; ideo non trahit ipsum "nichil" ad supponendum pro futuris sed solum pro presentibus ratione huius verbi "est," quod est presentis temporis. Ideo vera est propositio. Sic non est de illa propositione alia "aliquid potest produci de non esse ad esse." Hec est vera, quia isti dictioni "aliquid" additur hoc verbum "potest," quod respicit futurum; ideo trahit ipsum ad supponendum pro futuris. Ideo etc.

Tunc ad propositum sciendum quod nomina significant sine tempore, ex primo *Peryarmenias*; ideo nomen indifferenter significat presens, futurum et preteritum. Ratio: si non significaret sic, non posset pro eis supponere, et tamen potest pro eis supponere, quia possum dicere "a mille annis fuerunt multi homines" et quod ad mille annos post erunt multi homines; quod non esset verum, nisi ille terminus "homines" indifferenter supponeret pro presentibus, preteritis et futuris; ideo. Ad dictum modo dico quod in habendo conceptum communem hominis, a quo sumitur ille terminus "homo," indifferenter concipio homines presentes, preteritos et futuros, quia omni propositioni universali(?) oportet quod correspondeat mentalis, ideo, ⟨quia⟩ de preteritis habeo prolocutionem(?), ideo oportet quod terminus mentalis supponat pro illis. Ideo etc.

Ex hiis concludo quod hec verba "significare," "concipere," "intelligere" et huiusmodi non respiciunt determinate presens tempus quantum ad res significatas, sed respiciunt indifferenter presens, preteritum et futurum, licet in presenti determinate significent. Unde non est sicud de illo termino "lego," quia ille non respicit nisi presens. Ideo illa verba trahunt terminum cui adiunguntur ad supponendum indifferenter pro presentibus, preteritis et futuris. Ideo non sequitur "aliquid intelligitur; igitur aliquid est quod intelligitur," sicud non sequitur "aliquid potest produci de non esse ad esse; igitur aliquid est *etc*.," vero ibi est fallacia figure dictionis, quia in prima ille terminus "aliquid" stat indifferenter pro presentibus, preteritis et futuris, in secunda vero pro presenti tantum. Ideo dixi quod nichil est quod per hanc vocem "rosa" significatur, si nulla est rosa, tamen hec est vera "aliquid significatur."

104$^{va}$ Nunc respondeo dicens(?) ad questionem, quando queritur, | suppositione facta, utrum hec dictio "rosa" significet et significabat idem heri et hodie, possemus dicere quod ille dictiones "heri" et "hodie" possunt uno modo intelligi quod determinant illa verba "significet" et "significabat"; et sic ego dico quod

1–2 ille terminus ... temporis. Ideo] *haec verba delevi ex comparatione MS 2185*: modo isti termino "nichil" vel "non aliquid" additur hoc verbum "est," quod est presentis temporis. 17 ad dictum] *MS 3097* eodem *MS 2185*. 19–21 quia omni propositoni ... ideo etc.] *MS 3097* igitur oportet quod ille terminus mentalis supponat pro eis et similiter conceptus (*corr. ex* terminus) sibi correspondens est indifferenter presentium preteritorum et futurorum *MS 2185*. 33 significatur] *posui ex comp.* p. 159$^{9}$ est igitur *MS 3097, def. in MS 2185*.

questio est vera, quia hodie illa vox et heri significabat idem, scilicet rosam que heri fuit. Alio modo potest intelligi quod ille dictiones "heri" et "hodie" determinent hoc nomen "idem"; tunc dicerem quod hec propositio est falsa, quia hodie nichil est, ideo non est idem hodie et heri, quia idem et diversum sunt differentie entis positivi.

Hiis visis respondeo ad rationes.

"Vox significat rem illam" verum est; "rosa non est eadem heri et hodie" verum est; "ideo non est idem quod significatur hodie et heri, quia non est," tu accipis ibi tempus presens "non est idem (eadem *MS*)," sic vox non supponit nisi pro presentibus; "ergo non significat idem" non sequitur, quod iam ille terminus "idem" supponit indifferenter pro presentibus, preteritis et futuris; et mutatur ibi suppositio procedendo ab hoc verbo "est" ad "idem significare."

Ad aliam: "quando res est, vox significat aliquid" concedo in minori(?), dicendo quod hec vox[102] significat presens, preteritum et futurum; "non est quod significat rosa, cum rosa nichil est"; tamen non sequitur "igitur nichil significat," quia iam trahis suppositionem determinatam de presenti ad suppositionem indifferentem pro presenti, preterito et futuro. Etc.

4–5 quia hodie ... positivi] *MS 3097* quia vox non significat et significabat idem heri et hodie, quia hodie nichil est *MS 2185*. 11–12 et mutatur ... significare] *MS 3097* et illa res que heri significabatur modo hodie significatur *MS 2185*.

**102.** *scil.* "aliquid."

# Albert von Sachsen und die "Physik" des *ens mobile ad formam*

*Jürgen Sarnowsky*

Unter den Mitgliedern der "Pariser Schule" der Mitte des 14. Jahrhunderts war der zwischen 1351 und 1361 in Paris nachweisbare Albert von Sachsen ein Philosoph der zweiten Generation, der die Lehren des älteren Johannes Buridan wie die des wohl etwa gleichaltrigen, aber in den fünfziger Jahren schon an der Sorbonne lehrenden Nicole Oresme aufnahm und in häufig recht ähnlicher Form wiedergab.[1] Neben logischen und moralphilosophischen Schriften hat er zahlreiche naturphilosophische Texte verfaßt, vor allem Kommentare zu den Werken des Aristoteles. Im Zusammenhang mit dem Einfluß des "Buridanismus" auf die neugegründeten Universitäten des östlichen Mitteleuropa und Italien wurden diese Schriften weit verbreitet und verdrängten teilweise — vor allem in Italien — die Werke Buridans und Oresmes.[2] Diese Rezeption fand auch in zahlreichen, vor allem in Italien entstandenen Drucken des späten 15. und frühen 16. Jahrhunderts ihren Ausdruck. Im Bereich der Naturphilosophie wurden die Kommentare zum aristotelischen *De caelo* wahrscheinlich sechsmal, zur Physik achtmal und zu *De generatione et corruptione* mehr als zehnmal gedruckt, der an Thomas Bradwardine orientierte *Tractatus proportionum* sogar mehr als fünfzehnmal zwischen 1476 und 1580.[3] Alberts erstaunlicher Erfolg läßt sich wohl auch mit seiner Art der Darlegung der Probleme erklären: Setzten z.B. die Schriften Nicole Oresmes oft ein recht hohes Niveau beim Leser voraus,[4] ging es Albert offenbar vor allem um eine allgemein verständliche und übersichtlich aufge-

1. Zu Albert und seiner Abhängigkeit von Buridan und Oresme siehe Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 58-64 u.ö.; die recht umfangreiche Literatur zu Albert verzeichnet jetzt: Berger, "Albert von Sachsen. Bibliographie"; ders., "Albert von Sachsen. Fortsetzung"; ders., "Albert von Sachsen. 2. Fortsetzung."
2. Zur Geschichte des "Buridanismus" vgl. Michael, *Johannes Buridan*, II, pp. 321-389 (dort pp. 373 und 382 zur Rolle Alberts in Italien).
3. Siehe die Liste der Drucke bei Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 448-451. Eventuell sind einige der aus der Sekundärliteratur entnommenen Drucke zu streichen. — Die Angaben zu *De generatione* bedürfen zweifach der Korrektur: Nr. 31 und die folgenden, daran orientierten Drucke enthalten natürlich die Kommentare von Ägidius Romanus und Marsilius von Inghen zu *De generatione*; der Hinweis auf Egidio Colonna (=Ägidius Romanus) bezieht sich auf den Inhalt und nicht den Herausgeber, kann also entfallen.
4. Das gilt z.B. für seine Behandlung der Verhältnisse in Bewegungen, Nicolaus Oresmius, *De proportionibus proportionum* (Grant), die mit einer intensiven mathematischen Diskussion der Probleme beginnt.

baute Darstellung.[5] Dazu gehörte auch die enge Verknüpfung mit den anderen Texten des aristotelischen "Korpus," den er wie seine Zeitgenossen als eine Einheit verstanden hat.[6] In seiner nur in einer Handschrift überlieferten Expositio zur aristotelischen Physik unterscheidet er neun Teile der Naturphilosophie nach ihren Gegenständen und ordnet ihnen jeweils eine Schrift des Aristoteles zu.[7] Allen Teilen gemeinsam ist die Beschäftigung mit dem *ens mobile*, dem bewegten Seienden; die Physik setzt sich damit allgemein auseinander, die anderen Texte von *De caelo* bis zu *De vegetabilibus et plantis* unter jeweils anderen Voraussetzungen. Alle diese Schriften stehen somit für Albert in inhaltlicher Beziehung.

Die enge Anbindung an die Physik und die anderen Schriften des Aristoteles wird auch in Alberts Kommentar zu *De generatione* deutlich. Diese Schrift befaßt sich nach seiner Einteilung in der Expositio zur Physik mit dem *ens mobile secundum quod est mobile ad formam*, dem "nach der Form" Bewegten, d.h. mit dem Seienden, das Entstehen, Vergehen und verwandten Bewegungen wie Vermehrung und Qualitätsveränderung (*alteratio*) unterworfen ist.[8] Stärker noch als bei seinen Zeitgenossen gerät seine Diskussion der Probleme jedoch zu einer "Physik" des *ens mobile ad formam*, einer Art Anhang zur Physik. Nach einigen Bemerkungen zur Überlieferung und Rezeptionsgeschichte des Texts (in Abschnitt I) will ich diesem Zusammenhang in zwei Schritten nachgehen: einmal am Beispiel einiger ähnlich auch im Kontext der Physik behandelten Probleme (in Abschnitt II), zum andern für einige für *De generatione* "typische" Fragestellungen (in Abschnitt III).

5. Grant, "The Unusual Structure," behandelt den Kommentar zu *De caelo* als ein besonders "gelungenes" Beispiel.
6. Dazu vgl. Lohr, "The Medieval Interpretation of Aristotle," p. 80; Crombie, *Von Augustinus bis Galilei*, pp. 53-62; (zu Averroes) Sarnowsky, "Averroes," p. 272; (zur Rezeption an den Universitäten) Dod, "Aristoteles Latinus," pp. 69-72; Grant, *Physical Science*, pp. 20-35; (zur Integration der aristotelischen Schriften in die *artes liberales*) Weisheipl, "The Nature," pp. 475-477; ders., "The Interpretation," pp. 521-522.
7. Albertus de Saxonia, *Expositio libri Physicorum*, MS Brugge, Stadsbibliotheek, 477, fol. 1[ra]: *Quoniam autem intellegere et scire ... Unde sciendum est, quod philosophia naturalis dividitur in novem partes. Prima pars est de ente mobili simpliciter non contractum ad aliquem motum specialem ... Secunda pars est de ente mobili contractum ad motum localem ... Tertia pars est de ente mobili secundum quod est mobile ad formam, id est, secundum quod est generabile et corruptibile et secundum quod est mobile motibus annexis generationi et corruptioni sicut augmentatio, alteratio et alio. Quarta pars considerat de ente mobili quo ad passiones eius communes consequentes actionum et passionum qualitatum primarum adinvicem* ... Diesen ersten vier Bereichen entsprechen die von der Physik, *De caelo, De generatione* und den *Metheora* abgedeckten Probleme. Eine fast identische Einteilung der Naturphilosophie findet sich schon im 13. Jahrhundert z.B. bei Galfried de Aspell (Haspyl), vgl. Murdoch e.a., "The Science of Motion," pp. 206-207 (mit weiterer Literatur), sowie ähnlich bei Thomas Aquinas, *In octo libros de Physico auditu* (Angeli e.a.), p. 14, Nr. 4. — Zur Überlieferung der Physikkommentare Alberts vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 38-40, 439-441, 450.
8. Wie vorige Anm. Zu den Formen der Bewegung im aristotelisch-scholastischen Verständnis vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 240-251, u.ö.

## Überlieferung und Rezeption des *De generatione*-Kommentars

Die Überlieferung einer Schrift ist nicht nur für die Herstellung einer weitmöglichst dem Original nahekommenden Textfassung, sondern auch für die Rezeptionsgeschichte von größter Bedeutung. In dieser Beziehung stellt der Kommentar Alberts von Sachsen zu *De generatione* ein Kuriosum dar: Den mehr als zehn Drucken der Jahre zwischen 1480 und 1568 stehen, soweit mir bekannt ist, keine Handschriften gegenüber. Die von Charles Lohr aufgeführten drei Manuskripte enthalten sämtlich andere Texte, die Turiner Handschrift den Kommentar des Marsilius von Inghen, die Eichstätter Exzerpte daraus, die Krakauer eine anonyme Expositio.[9] Der mit großer Wahrscheinlichkeit Albert zuzuschreibende Kommentar zur *Philosophia pauperum* mit einem Teil zu *De generatione* bietet dafür keinen Ersatz, da er von einer völlig anderen philosophischen Konzeption ausgeht und nichts mit den gedruckten Quaestionen gemeinsam hat.[10] In einem Prager Manuskript findet sich schließlich wohl nur ein an die vorliegende Fassung angelehnter Kommentar zu *De generatione*.[11]

Basis einer inhaltlichen Auseinandersetzung mit Alberts Kommentar können so nur die Drucke sein. Aber auch hier erweist sich die Vielfalt nur als Schein. Die in Venedig gedruckten Ausgaben enthalten wie die im Nachdruck vorliegende von 1505 wohl fast alle auch die Kommentare des Ägidius Romanus und des Marsilius von Inghen, wahrscheinlich nach dem Vorbild des Drucks Padua 1480. Man kann davon ausgehen, daß hierbei derselbe Text zugrundegelegt wurde. Eine eigenständige Tradition versprechen auf den ersten

9. Lohr, "Medieval Latin Aristotle Commentaries, Authors A-F," p. 351. — Anonymus, *Exzerpta ex Marsilius de Inghen, Quaestiones in libros De generatione*. MS Eichstätt, Staats- und Seminarbibliothek, 565, fols. 88$^{r}$-102$^{v}$, *Utrum ens mobile ad formam sit subiectum scientia libri de generatione. Non, philosophia naturalis, et philosophia consideramus* ... , sind entgegen der neuzeitlichen Überschrift Exzerpte des 15. Jahrhunderts aus dem Kommentar des Marsilius von Inghen; Anonymus, *Liber De generatione et corruptione [Expositio]*. MS Kraków, Biblioteka Jagiellonska, cod. 648, fol. 65$^{ra}$ ff., *Incipit liber De generatione et corruptione, tercius liber in magnis libris* ... enthält nach Markowski e.a., *Repertorium*, p. 27, eine anonyme Expositio zu *De generatione*; Marsilius de Inghen, *Quaestiones in libros De generatione*. MS Torino, Biblioteca Nazionale, G I 22 (Pasinus 958), fols. 58$^{ra}$-117$^{ra}$ beginnt (nach dem Film, den ich einsehen konnte) fragmentarisch am Ende von Quaestio 1, 1 mit *negatur quod de ipsius* ... *oppositum arguitur pro tertia conclusione* und geht dann mit folgender Quaestio 1, 2 weiter: *Secundo queritur utrum aliquid possit simpliciter generari aut corrumpi. Et arguitur primo, quod non, quia nulla substantia potest generari* ... — damit handelt es sich eindeutig um den Kommentar des Marsilius von Inghen (bei Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, p. 443, ist so Nr. 147 zu streichen).

10. Zum Text und seiner Überlieferung siehe Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 45 und 446; der Teil zu *De generatione* findet sich nur im MS Wien, Bibliothek des Dominikanerkonvents, 93/57, fols. 1$^{ra}$-98$^{rb}$ (hier: fols. 44$^{va}$-55$^{rb}$).

11. Alexander de Třebovia, *De generatione et corruptione [Quaestiones]* MS Praha, Statni Knihovna ČSR (*olim* Bibliotheca Universitatis), 561 (III.H.8), fols. 177-188., *Primus De generatione et corruptione. Utrum aliquid simpliciter potest generari et corrumpi. Generacio est duplex* ... — ... *patet, quia sol pluries generatur super nostro orisonte, igitur etc. Et sic est finis huius operis etc.*, von der Hand und möglicherweise auch verfaßt von dem Prager Magister Alexander de Třebovia; vgl. Korolec, *Repertorium*, pp. 19-23.

Blick die beiden Pariser Ausgaben von 1516 und 1518, in denen der Kommentar zu *De generatione* als Ergänzung zu Alberts Quaestionen zur Physik und *De caelo*, zu den *Metheora* des Thimo Judaicus und den Parva Naturalia Johannes Buridans enthalten ist.[12] Doch wird dieses Versprechen nicht eingelöst: Der Druck Paris 1516 stimmt Wort für Wort mit dem Druck Venedig 1505 überein, ist also aus den italienischen Vorlagen übernommen.

Man könnte fast an der Authentizität des einen unter dem Namen Alberts von Sachsen überlieferten Texts von Quaestionen zu *De generatione et corruptione* zweifeln, gäbe nicht der venezianische Druck wahrscheinlich wörtlich das Explizit mit der Zuschreibung nach dem Vorbild einer dafür benutzten Handschrift von 1385.[13] Von einer breiten Wirkung dieser Schrift im späten Mittelalter kann man so — im Gegensatz zu den Kommentaren Alberts zur Physik und zu *De caelo* — auf keinen Fall sprechen; der Text wurde erst für die Renaissance interessant und hat dann auch im Italien des 16. Jahrhunderts eine gewisse Wirkung erzielen können.[14]

## Die Beziehungen zwischen Alberts Kommentaren zu *De generatione* und zur Physik

Die Beschäftigung Alberts von Sachsen mit den in De generatione berührten Problemen steht, wie bereits Anneliese Maier vermerkt hat,[15] in der Tradition der Kommentare des Ägidius Romanus und Johannes Buridans.[16] Legt man den *De generatione*-Kommentar Nicole Oresmes zugrunde,[17] hat er sich aber vor allem

12. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 450-451, mit den oben, Anm. 3, genannten Korrekturen; der Textvergleich beruht auf Albertus de Saxonia, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505), und in *Questiones et decisiones physicales* (Paris, 1516). Eine Liste der Quaestionen nach dem zweiten Druck (in dem qu. 2, 15 fehlt) in englischer Übersetzung bei Grant (ed.), *A Source Book*, pp. 205-206.
13. Albertus de Saxonia, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505), fol. 155$^{rb}$: *Expliciunt questiones de generatione et corruptione edite a magistro Alberto de Saxonia. Deo gratias. Amen*, ist doch wahrscheinlich angesichts des Explizits fol. (156)$^{rb}$: *Explicit tabula totius libri de generatione et corruptione. Deo gratias. Amen. 1385 die 13. Aprilis*, wie dieses aus der Handschrift übernommen.
14. Vgl. dazu Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, p. 70; zur Wirkung der Pariser *De generatione*-Kommentare in Italien vgl. jetzt auch Thijssen, "The Circulation."
15. Maier, *An der Grenze*, p. 118.
16. Diese Kommentare sollen im folgenden vergleichend herangezogen werden, Ägidius' Text nach dem Druck Aegidius Romanus, *Commentaria in libros De generatione et corruptione* (Venezia, 1505), fols. 2$^{ra}$-64$^{vb}$, *Anima, ut testatur Philosophus in tertio De anima, est quodammodo omnia, quicquid enim est, vel est sensibile vel intelligibile* ... — Buridans Schrift wird zitiert nach MS Berlin, Staatsbibliothek, Preußischer Kulturbesitz, lat. fol. 387, fols. 129$^{ra}$-156$^{vb}$, *Circa librum de generatione et corruptione primo queritur utrum de generabilibus et corruptibilibus sit scientia. Et arguitur, quod non, quia quod non est...* (ohne Prolog), obwohl der Text als "Reportation einer Reportation" nicht sehr zuverlässig ist, siehe Michael, *Johannes Buridan*, II, pp. 635-642.
17. Über Oresmes Kommentar gab es nach den Überlegungen von Maier, *An der Grenze*, pp. 120-124, einige Unklarheiten, vgl. Lohr, "Medieval Latin Aristotle Commentaries, Au-

an dessen Vorbild orientiert, und zwar teilweise sogar wörtlich, ähnlich wie ihm seinerseits Marsilius von Inghen gefolgt ist.[18] Anders als bei Buridan, Oresme oder auch bei Marsilius fehlt jedoch bei Albert eine eigenständige Diskussion des Wissenschaftscharakters der *scientia de generatione* bzw. des Gegenstands der aristotelischen Schrift, wenn man von einigen knappen Überlegungen zur Evidenz dieser Naturvorgänge absieht.[19] Damit löst sich die schon im überlieferten aristotelischen Text nur recht künstlich hergestellte Einheit auf, und die Einzelprobleme rücken in den Vordergrund. Dies wird in Alberts Kommentar auch auf andere Weise deutlich gemacht: Sofern dies nicht nur eine Zutat des Herausgebers oder des Schreibers der Vorlage ist, sind zugleich in einer eigentlich für Albert typischen Form vor der ersten Quaestio die vier wichtigsten Problembereiche des ersten Buchs genannt: 1. *generatio* und *corruptio*, 2. *augmentatio*, 3. *alteratio* und 4. *mixtio*.[20] Angesichts dieser "Zersplitterung" der behandelten Fragen treten nun die Querverbindungen zur aristotelischen Physik stärker hervor als bei den zeitgenössischen Autoren. Da der Begriff des *ens mobile ad formam* nur gerade noch die Einheit des Gegenstands begründet, muß die Physik mit ihrem "Reservoir" von Grundfragen, Methoden

thors Narcissus-Ricardus," p. 297, doch handelt es sich bei dem von ihr behandelten Text wohl eindeutig um eine andere (ältere?) Fassung des Buridanschen Kommentars, vgl. Michael, *Johannes Buridan*, II, pp. 642-646; Thijssen, "Buridan," pp. 72-80. Für Oresmes Text kommt deshalb mit Lohr, "Medieval Latin Aristotle Commentaries, Authors Narcissus-Ricardus," pp. 295-296 (mit falschem Incipit), in Frage: MS Firenze, Biblioteca Nazionale Centrale, Conv. Soppr. H.9. 1628, fols. $1^{ra}$-$77^{vb}$, *Utrum possit evidenter commenti aliquam generabilem esse. Et arguitur, quod non, nam non videtur, quod possit commenti aliquam esse de novo ...*, mit einer zeitgenössischen, aber wohl von anderer Hand stammenden Zuschreibung am Ende des Textes: *Explicit liber de generatione et corruptione Nicolai Orem* (fol. $77^{vb}$). Dieser Text bildet jetzt (mit zwei weiteren, jedoch unvollständigen Handschriften) die Grundlage der Edition von Stefano Caroti: Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti). Da mein Beitrag mit Hilfe eines Mikrofilms vor Erscheinen dieser Ausgabe erarbeitet wurde, sind die Folioangaben des genannten Manuskripts jeweils durch die Seiten der Edition ergänzt worden.

18. Marsilius' Schrift ist zitiert nach Marsilius de Inghen, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505), fols. $65^{ra}$-$139^{rb}$, *Circa primum librum de generatione primo queritur, utrum ens mobile ad formam sit subiectum libri de generatione. Et arguitur, quod non. Anima est subiectum libri ...* Die Kommentare Nicole Oresmes, Alberts von Sachsen und Marsilius' von Inghen zeigen eine recht eindeutige Traditionslinie auf, die jetzt die umfangreiche Einleitung Stefano Carotis in Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), pp. 58*-199*, deutlich macht. Aus Raumgründen sind Querverweise auf diese fundierte, nach meinem Vortrag von 1991 erschienene, Darstellung nur in Ausnahmefällen eingearbeitet worden, doch bietet sie zum folgenden zahlreiche Ergänzungen.

19. Der Kommentar Alberts wird im folgenden nach der Ausgabe Albertus de Saxonia, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505), fols. $132^{ra}$-$155^{ra}$, *Primo circa generationem et corruptionem, secundo circa augmentationem, tertio circa alterationem, quarto circa mixtionem. Primo queritur utrum possibile sit aliquid simpliciter generari vel corrumpi simpliciter. Arguitur primo, quod non, quia non est possibile aliquid generari, ergo questio falsa ...*, zitiert; qu. 1, 1, 2. art., fol. $132^{va-vb}$, setzt sich mit der *evidentia summa* und *naturalis* bei Entstehen und Vergehen auseinander, vgl. unten. — Die *De generatione*-Kommentare werden von nun an wie ihre Vorlage nur unter den Namen der Autoren zitiert.

20. Diese "Zusammenfassung" ist Teil des Incipits, wie vorige Anm.

und grundlegenden Lösungen eine wichtige Klammerfunktion in der Diskussion des aristotelischen *De generatione* erfüllen. Dazu kommt — ähnlich wie bei Alberts Zeitgenossen — daß einige der Quaestionen auch dem Kontext eines Physikkommentars entstammen könnten.

Das gilt vor allem für die Fragen 14 bis 17 zum ersten Buch. In Quaestio 1, 14 wird die Möglichkeit von Fernwirkungen diskutiert, mit der Problemstellung, *utrum omnis actio et passio fit per contactum*, "ob alles Bewirken und Erleiden durch Kontakt geschieht."[21] Ausgangspunkt sind die Überlegungen am Anfang des sechsten Kapitels, in dem es Aristoteles nach der Unterscheidung von Werden und Vergehen auf der einen und Veränderung und Wachstum auf der anderen Seite um die Grundlegung von Wirken und Mischen geht. Voraussetzung für beides ist der Kontakt.[22] Alberts negative Eingangsthese gründet sich auf ein Arsenal von Argumenten, das sich bereits in der Diskussion des aristotelischen Prinzips der Simultaneität von Beweger und Bewegtem im siebenten Buch der Physik findet.[23] Danach würden Gott und die Intelligenzen, die üblicherweise für die Erklärung der Himmelsbewegung herangezogen werden,[24] nichts berühren; die Wirkung des Sichtbaren auf unser Sehvermögen, der Himmelskörper auf die irdischen Körper, der Seele auf den Leib, der *gravitas* auf den Stein und des Magneten auf das Eisen seien ohne Kontakt möglich. Im siebenten und vorletzten Argument bringt Albert schließlich die Konsequenz der aristotelischen Aussage auf den Punkt: Es folgte, *quod nullum agens ageret ad aliquam distantiam*, "daß kein Beweger über irgendeine Entfernung wirken könnte."[25]

Wie schon aufgrund der Stellungnahme des Philosophen zu erwarten war, läßt sich eine solche Argumentation jedoch nicht aufrechterhalten, was schon durch einige begriffliche Unterscheidungen deutlich wird. Ein Bewegendes

21. Albert, qu. 1, 14, fol. 140$^{va}$; gleiche und ähnliche Fragestellungen bei Buridan, qu. 1, 18, fol. 141$^{rb}$; Oresme, qu. 1, 17, fol. 33$^{vb}$, p. 142; Marsilius, qu. 1, 16, fol. 83$^{rb}$.
22. Aristoteles, *De generatione et corruptione*, in Thomas Aquinas, *In Aristotelis libros De caelo et mundo, De generatione et corruptione, Meteorologicorum expositio* (Spiazzi), 1, cap. 6, t.c. 43, 322b21-29, p. 511 (da die Ausgabe der *translatio nova* im Rahmen des Aristoteles Latinus noch nicht vorliegt, wird hier nach dem Begleittext des Thomas-Kommentars und seines Fortsetzers zitiert, der der *translatio nova* nahesteht, vgl. Aristoteles, *De generatione et corruptione* (Judycka), Einleitung, bes. p. XII, in der Annahme, daß dieser Text im 14. Jahrhundert häufiger benutzt wurde; neben Buch und Kapitel werden jeweils der *textus commenti* des Averroes und die Bekkerzählung angeführt); vgl. Averroes, *Commentarium medium in Aristotelis De generatione et corruptione libros* (Fobes e.a.), p. 60: *Quod enim patitur tangitur, et quod admiscetur, patitur et tangitur*; Ägidius, *De generatione*, fol. 20$^{rb}$. Zum aristotelischen Zusammenhang vgl. Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*, pp. 35-38.
23. Zur aristotelischen Grundlage und zur scholastischen Diskussion, insbesondere zur Position Alberts, vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 312-321; zum mittelalterlichen Kontext vgl. Oresme, *De generatione*, pp. 126*-130*.
24. Allgemein vgl. Weisheipl, "The Celestial Movers"; Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 102-103, 376-377, 390-391, 400.
25. Albert, qu. 1, 14, quod non, 7, fol. 140$^{va}$; vgl. Oresme, qu. 1, 17, quod non, 2, fol. 33$^{vb}$, p. 142 (mit weiteren allgemeinen Argumenten); Marsilius, qu. 1, 16, quod non, 3, fol. 83$^{rb}$.

kann in Beziehung zu einem Bewegten stehen, indem es seine Kraft (*virtus*) auf ein Drittes einwirken läßt, das diese Kraft "weitergibt," mit Hilfe eines *agens particulare* oder durch die Kraft selbst. Kontakt ist unter anderem im mathematischen Sinn möglich, d.h. zwischen Größen mit einem sich berührenden Ende und ohne Überschneidung der Orte, oder im natürlichen Sinn, d.h. zusätzlich unter Berücksichtigung von Wirkungen aufeinander.[26] Auf dieser Grundlage erweisen sich die Eingangsargumente als unzutreffend: Alle gehen mehr oder weniger von körperlichem Kontakt aus, d.h. von Berührung im mathematischen Sinn, doch liegt den angeführten Beispielen ein Kontakt nur der *virtus* nach zugrunde.[27] Das gilt auch im Fall des in diesem Zusammenhang häufig genannten Magneten, der ja offensichtlich nicht auf die zwischen ihm und dem Eisen befindliche Luft, wohl aber auf das Eisen selbst einwirkt, und ebenso für ein Eisen, das vom entfernten Feuer mehr als die Luft erwärmt wird. Die *virtus* wirkt unterschiedlich auf verschiedene "Medien," so daß ihr Einfluß für uns nicht immer wahrnehmbar ist; auf jeden Fall wird aber durch sie in beiden Fällen mit Hilfe einer *qualitas insensibilis* ein Kontakt hergestellt.[28]

Die in sieben Schlüssen formulierten Ergebnisse fallen dann auch ganz im Sinne der konventionellen scholastischen Lösung aus: Für das körperliche *agens* gilt grundsätzlich, daß es das passum körperlich oder durch seine virtus berührt. Dieser Kontakt ist in der Regel im uneigentlichen Sinne zu verstehen, denn für die Wirkung bedarf es eines Mediums. Das Medium wird "kugelförmig" beeinflußt, sofern dem nicht Hindernisse entgegenstehen. Der vierte Schluß legt auf dieser Grundlage das Kriterium für eine "Fernwirkung" fest: *Agens agendo in distans agit aliquid in intermedium*, "Ein über eine Entfernung wirkender Beweger bewirkt (auch) etwas im Dazwischenliegenden."[29] Das ist nichts anderes

26. Albert, qu. 1, 14, 1. art., 1 und 3, fol. 140$^{va}$; vgl. Buridan, qu. 1, 18, not., fol. 141$^{rb}$. Zum Kontext siehe schon Thomas de Sutton, *De generatione et corruptione* (Kelley), pp. 50-52, sowie zu Albertus Magnus (der zur Unterscheidung von Albert von Sachsen immer mit seinem Beinamen zitiert wird): Hossfeld, "Grundgedanken," p. 195.
27. Albert, qu. 1, 14, ad rat., 1-3, 5-8, fol. 141$^{ra}$. Aufgrund etwas anderer Unterscheidungen ist die Auflösung bei Oresme und Marsilius erheblich umfangreicher.
28. *Ibid.*, dub. 1-2, fols. 140$^{vb}$-141$^{ra}$; vgl. Oresme, qu. 1, 17, dub. und tunc dico, fol. 34$^{vb}$ und 35$^{rb}$, pp. 145 und 147. Zur mittelalterlichen Theorie des Magnetismus vgl. Crombie, *Von Augustinus bis Galilei*, pp. 116-119.
29. Albert, qu. 1, 14, 2. art., 1.-7. concl., 140$^{vb}$; die anderen Schlüsse lauten: (1) *De agentibus corporalibus non oportet, quod tangant illa, in qua agunt* ... (2) *Omne agens corporale in agendo actionem suam agit circa se suam actionem orbiculariter nisi sit impedimentum* ... (3) *Quodlibet agens requirit medium, in quod agat* ... (5) *Quodlibet agens corporale in agendo tangit aliquod passum, in quod agit* ... (6) *Si loquimur de tactu proprie dicto, nullum agens corporale tangit quodlibet, in quod agit* ... (7) *Quodlibet agens corporale tangit passum, in quod agit, corporaliter vel sua virtute* ... Das unkörperliche *agens* wird damit anders als bei Oresme, qu. 1, 17, 2. art., 1. concl., fol. 34$^{va}$, p. 144, und Marsilius, qu. 1, 16, 2. art., 1. concl., fol. 84$^{ra}$, nicht behandelt, obwohl es in den Distinktionen eine Rolle spielt.

als der immer wieder aufgenommene scholastische Grundsatz: *Nihil agit in distans nisi (prius) agat in intermedium.*[30]

Ich habe diese Argumentation deshalb so ausführlich dargestellt, um zu zeigen, in welchem Maße sich hierbei die Beweisführung von der direkten aristotelischen Vorlage löst. Albert folgt dabei seinen Vorbildern, doch wird diese Tendenz bei ihm noch gesteigert. Ähnlich gilt das auch für die Quaestio 1, 15, die sich mit der Frage beschäftigt, *utrum simile possit agere in sibi simile*, "ob Ähnliches auf (sich) Ähnliches einwirken kann."[31] Den Ausgangspunkt dafür bildet die aristotelische These im 7. Kapitel des ersten Buchs von *De generatione*, daß sich zwischen völlig ähnlichen Dingen keine Wirkung feststellen lasse: Nicht alles kann aufeinander wirken, sondern nur das, was gegensätzlich ist oder einen Gegensatz an sich hat, und zwar einen Gegensatz der Art, während es der Gattung nach ähnlich sein muß.[32]

Alberts Quaestio zielt damit zunächst nur auf einen Teilaspekt der aristotelischen Lösung. Unter den Argumenten für eine mögliche Rolle von Ähnlichkeit als Ursache für Bewegung nennt er wiederum das Beispiel des Eisens, das von einem Feuer besonders intensiv erwärmt oder von einem Magneten angezogen wird, weil zwischen ihnen eine bestimmte *similitudo* besteht.[33] Dem steht jedoch das aristotelische Diktum entgegen, daß *similia* nicht aufeinander einwirken können; wie schon im Kontext des fünften Buchs der Physik[34] steht also die Bedeutung von Gegensätzen für die Bewegung im Vordergrund, und erst die Schlüsse machen deutlich, daß auch Ähnlichkeit "im Spiel" ist, gipfelnd in der aristotelischen Feststellung über die für eine Bewegung notwendige Ähnlichkeit der Gattung nach.[35] Zugleich rückt Albert den Prozeß stärker in das Blickfeld, wenn er das Verhältnis zwischen *actio* und *passio* in bezug auf Anfang, Mitte und Ende der Bewegung bestimmen will und im Sinne der Diskussionen in der Physik gleichermaßen Subjekt, Ausgangspunkt und "Ziel" zu betrachten sind. Im Ausgangspunkt läßt sich Widerstand gegen die Bewegung konstatieren, während das Ziel dem Bewegenden auf gewisse

30. So (ohne die Ergänzung) auch Albert, *ibid.*, dub. 1. Zu Alberts Physikkommentar vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 318-320.
31. Albert, qu. 1, 15, fol. 141$^{ra}$; vgl. Oresme, qu. 1, 18, fol. 35$^{vb}$, p. 149; Marsilius, qu. 1, 18, fol. 85$^{ra}$.
32. *Sed quoniam non quodcumque natum est pati et facere, sed quaecumque aut contraria sunt aut contrarietatem habent, necesse et patiens et faciens genere quidem simile esse et idem, specie autem dissimile et contrarium* ... : Aristoteles, 1, cap. 7, t.c. 50, 323b30-33, p. 515 (dazu siehe Sambursky, *Das physikalische Weltbild*, p. 509); vgl. Averroes, p. 66: *Necesse est ut activa et passiva sint consimilia in genere et dissimilia in specie* ... ; Ägidius, fol. (22)ra.
33. Albert, qu. 1, 15, quod sic, 9-12, fol. 141$^{ra-rb}$; siehe auch Oresme, qu. 1, 18, quod simile, 10-11, fol. 36$^{ra}$, pp. 150-151; Marsilius, qu. 1, 18, quod sic, 12, 85$^{va}$.
34. Zur Behandlung des Themas bei Aristoteles und seinen scholastischen Kommentatoren vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 240-257.
35. Albert, qu. 1, 15, 2. art., 4. concl., fol. 141$^{va}$; wie Oresme, qu. 1, 18, 2. art., ultima (4.) concl., fol. 36$^{va}$, pp. 152-153; die Diskussion bei Marsilius geht erheblich über die aristotelische Vorlage hinaus.

Weise verwandt ist. In der Bewegung kommt es so zu einer Annäherung von *agens* und *passum*, so daß der anfangs bestehende Gegensatz am Ende zumindest teilweise aufgehoben ist.[36]

Quaestio 1, 16 behandelt die Rückwirkung des Erleidenden auf das Bewirkende, *utrum omne agens in agendo repatitur*.[37] Für die positive Entscheidung kann Albert auf die Autorität des Philosophen verweisen, der dies nicht ausgeschlossen hatte.[38] Begründungen dafür ergeben sich auch aus *experientia* und *ratio*: Nach der Erfahrung wird Wasser nicht nur von einem hineingeworfenen glühenden Eisen erhitzt, sondern es kühlt dieses seinerseits auch ab; eine ähnliche Rückwirkung läßt sich bei einem in die Hand genommenen Stein oder bei gleichzeitig in ein Gefäß gegossenem kalten und warmen Wasser beobachten; schließlich wirkt nicht nur — wie schon Aristoteles betonte — die aufgenommene Nahrung auf den Körper, sondern vielmehr wird diese selbst bei der Nahrungsaufnahme verändert. Vernunftgründe dafür lassen sich weiter aus dem Kontext von *De generatione* selbst gewinnen: Die Erzeugung eines Elements aus zwei anderen Elementen und die "perfekte" Mischung setzen eindeutig eine Rückwirkung des Bewegten auf das Bewegende voraus.[39]

Ähnlich wie unter anderem Oresme stellt Albert danach jedoch das Ergebnis durch *dubia* in Frage, die zum Teil auf der Kommentierung der Physik in der Mitte des 14. Jahrhunderts beruhen. Das gilt einmal für den Begriff der synkategorematischen Betrachtungsweise, der aus der Logik in die Behandlung des Unendlichen im dritten Buch der Physik übernommen worden war und nun auch hier angewandt wird:[40] Eigentlich müßte bei gleichförmiger Wirkung eines *agens* auf ein *passum* eine Rückwirkung im synkategorematischen Sinne stattfinden, also auf das Ganze des Bewirkenden, doch wird immer nur ein Teil des *agens* vom *passum* beeinflußt.[41] Zum andern widerspricht auch die im Kontext des siebenten Buchs der Physik diskutierte Relation von Kraft und Widerstand

36. Albert, qu. 1, 15, 1. art., 2.-3. dist., 2. art., 1.-3. concl., fol. 141$^{rb}$; wie Oresme, qu. 1, 18 (ohne entsprechende Distinktionen), 2. art., 1.-3. concl., fol. 36$^{rb\text{-}va}$, p. 152.
37. Albert, qu. 1, 16, fol. 141$^{vb}$; vgl. Buridan, qu. 1, 19, fol. 141$^{va}$; Marsilius, qu. 1, 19, fol. 87$^{va}$. Oresme, qu. 1, 11, *utrum in omni alteratione fiat reactio, et arguitur, quod non* ... , fol. 20$^{ra}$, p. 86, behandelt dies unter besonderem Aspekt. — Zur Problematik der *reactio* vgl. Caroti, "Da Buridano"; und ders., "Da Walter Burley."
38. Albert geht aus von einem "Diktum," *quod agens in agendo repatitur* (*ibid.*, in opp., fol. 142$^{ra}$), das sich in dieser Form nicht bei Aristoteles findet. Der Sache nach ist diese Feststellung jedoch enthalten in: Aristoteles, 1, cap. 7, t.c. 54, 324b2-6, pp. 518 (s. Verdenius/Waszink, *Aristotle*, pp. 38-39, 44-47); vgl. Averroes, pp. 68-69; Ägidius, fol. (22)vb.
39. Albert, qu. 1, 16, 1. art., fol. 142$^{ra}$; wie Oresme, qu. 1, 11, tunc, fol. 20$^{rb\text{-}va}$, pp. 87-88; etwas verkürzt bei Marsilius, qu. 1, 19, 2. art., fol. 88$^{ra}$ (vier *experientiae*); knapper auch bei Buridan, qu. 1, 19, opp., fols. 141$^{vb}$-142$^{ra}$.
40. Zu dieser Begrifflichkeit vgl. u.a. Maier, *Die Vorläufer Galileis*, p. 157, Anm. 2; Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 155-157.
41. Albert, qu. 1, 16, 2. art., 6. dub., fol. 142$^{rb}$.

in der Bewegung grundsätzlich der Möglichkeit einer *reactio*:[42] Da jede Bewegung voraussetzt, daß die Kraft des Bewegers größer ist als die des bewegten Dings, und die Rückwirkung die Verhältnisse umkehrt, folgt, *quod a proportione minoris inequalitatis fieret actio*, "daß Bewegung von einem ungleichen Verhältnis kleiner als eins ausginge,"[43] was aber unmöglich ist. Aus demselben Grund lehnt Albert im dritten Artikel seiner Quaestio eine Lösung ab, weil — in der Sprache der Oxforder Naturphilosophen[44] — *tunc non videtur penes quid tanquam penes causam deberet attendi velocitas et tarditas in motu alterationis*; weil "dann nicht erkennbar ist, wonach in bezug auf die Ursache Schnelligkeit und Langsamkeit in der Qualitätsveränderung gemessen werden können."[45] Die Annahme einer *proportio minoris inequalitatis* zwischen der Kraft des Bewegenden und der des bewegten Dings erlaubt keine Aussage über die Geschwindigkeit.[46] Daraus ergibt sich eine eingeschränkte Gültigkeit des "Reaktions"-Prinzips: Ein Rückwirkung scheidet aus, wenn das *passum* die Entfernung zum *agens* nicht überbrücken kann, wenn seiner Wirkung etwas entgegensteht und vor allem wenn der Widerstand des ursprünglich Bewirkenden zu groß ist. Die *reactio* unterliegt dabei in bezug auf Kraft und Widerstand denselben Bedingungen wie die ursprüngliche Bewegung, nur daß die beteiligten Faktoren und damit die für eine Wirkung notwendige *proportio maioris inequalitatis* neu zu bestimmen sind.[47]

In der 17. Quaestio des ersten Buchs setzt sich Albert negativ mit einer Veränderung von Unteilbaren auseinander, *utrum indivisibile possit alterari*.[48] Aristoteles hatte im achten Kapitel in seiner Analyse des Bewirkens und Erleidens die Lehren der Atomisten referiert und festgestellt, daß Unteilbares keine Einwirkung erfahren oder hervorrufen kann.[49] An dieser auch im sechsten Buch

42. Vgl. Murdoch e.a., "The Science of Motion," pp. 223-231; Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 324-341.
43. Albert, qu. 1, 16, 2. art., 1. dub., fol. $142^{ra}$; vgl. Oresme, qu. 1, 11, tunc, 1. diff., fol. $20^{va-vb}$, pp. 88-89; Marsilius, qu. 1, 19, 3. art., 1. dub., fol. $88^{rb-va}$.
44. Für die Unterscheidung zwischen der Betrachtung der Geschwinkeit *penes causam* und *penes effectum* vgl. Clagett, *The Science of Mechanics*, pp. 207-209; Sarnowsky, "Natural Philosophy," pp. 131-132.
45. Albert, qu. 1, 16, 3. art., 1. op., 2, fol. $142^{rb}$. Bei Oresme, qu. 1, 11, Nunc ponendo, (1), fol. $21^{ra-rb}$, pp. 90-91, und Marsilius, qu. 1, 19, 3. art., 1. modus, fol. $88^{vb}$, fehlt diese Begrifflichkeit.
46. Wie Albert am Beispiel des Vergleichs zweier *alterationes* mit den *agentia* a und b, den *passa* c und d, einem ungleichen Verhältnis von c zu a sowie einem gleichen Verhältnis von b zu d zeigt, den er auf ausführliche und recht umständliche Weise durchführt, *ibid.*, 1. op., 3, fol. $142^{rb-va}$. Sein Ergebnis, *una enim non est alteri maior, minor nec equalis*, setzt wieder das Bradwardinesche "Gesetz" voraus (wie Anm. 42).
47. Albert, qu. 1, 16, 3. art., 6. op., fol. $142^{vb}$; vgl. Buridan, qu. 1, 19, 2. concl., credo, fol. $142^{ra-rb}$; Oresme, qu. 1, 11, 6. modus, fol. $22^{ra-rb}$, pp. 94-95 (beide mit anderer Orientierung; es fehlt der deutliche Bezug zur Proportionenlehre); Marsilius, qu. 1, 19, 3. art., 7. modus, fol. $89^{rb-va}$.
48. Albert, qu. 1, 17, fol. $143^{ra}$; wie Oresme, qu. 1, 20, fol. $40^{ra}$, p. 164; Marsilius, qu. 1, 20, fol. $90^{va}$.
49. *Ut autem parum digredientes dicamus, necessarium impassibile unumquodque dicere indivis-*

der Physik angelegten Position hatte nur eine Minderheit unter den scholastischen Philosophen Kritik geübt.[50] Im Zusammenhang mit dieser Diskussion verbindet Albert wie vor ihm Oresme die Unmöglichkeit der Veränderung von Unteilbaren mit dem Problem des Unendlichen. Nachdem er zuvor den Begriff des *indivisibile* wie in der Physik eingeführt und die *alteratio* auf Körper beschränkt hat, geht er den Beweis in drei Schritten an: Im ersten Artikel zeigt er, daß ein Unteilbares nichts mit einem endlichen quale, dem Träger einer Qualität, gemeinsam haben kann; im zweiten schließt er aus, daß es sich dabei um ein unendliches *quale* handeln könnte; im dritten Artikel zieht er als Konsequenz aus diesen Ergebnissen den Schluß, *quod indivisibile, si esset, non posset alterari*, "daß das Unteilbare, wenn es existierte, nicht verändert werden könnte."[51]

Die Beweisführung des ersten Artikels beruht auf der im sechsten Buch der Physik entwickelten Theorie des Kontinuums, hier wie dort verbunden mit der Vorstellung der Teilung eines Körpers bzw. einer Qualität in *partes proportionales*, d.h. wiederholt durch denselben Faktor.[52] Ein auf diese Weise verkleinertes quale besitzt auch entsprechend weniger an Qualität, sofern diese "gleichmäßig" verteilt war; hätte die Hälfte des *quale* dieselbe Qualität, müßte sie von doppelter Intensität sein. Den Hintergrund dieser Überlegungen bilden Oresmes *configurationes qualitatum et motuum*[53] bzw. die diesen zugrundeliegende Trennung von Intensität und Ausdehnung einer Qualität innerhalb eines Subjekts. Die Folgerungen "liegen auf der Hand": Ein Punkt müßte aufgrund unendlicher Teilung eine unendlich intensive Qualität aufweisen, die zugleich insgesamt jedoch nicht größer als die des zuerst geteilten Gegenstands sein dürfte; verringerte man die Qualität insgesamt mit der Teilung des Subjektes, käme jedoch eine unendlich kleine Qualität heraus, die keine Wirkung mehr entfalten könnte, also ihre Eigenschaften verloren hätte. Kein Unteilbares im Sinne eines Punktes könnte so ein *quale* sein.[54]

*ibilium* ... *et nullius activum passionis* ... Aristoteles, 1, cap. 8, t.c. 64, 326a1-3, p. 524; vgl. Averroes, p. 76; Ägidius, fol. 25$^{rb}$.

50. So z.B. Walter Burley, vgl. in diesem Zusammenhang Sylla, "Infinite Indivisibiles," pp. 235-241 (u.a. zu seinem Physikkommentar); zur Diskussion der Qualitätsveränderung und des Kontinuums in der Physik vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 257-287; zu Oresmes Stellung im Pariser Kontext siehe Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), pp. 134*-39*.

51. Albert, qu. 1, 17, 3. art., 1, fol. 143$^{vb}$; vgl. Oresme, qu. 1, 20, 3. art., 1. concl., p. 173; Marsilius, qu. 1, 20, 3. art., 1. concl., fol. 92$^{ra}$.

52. Zu den *partes proportionales* vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, p. 157, Anm. 118, u.ö.

53. Siehe Clagett (ed.), *Nicole Oresme*; vgl. Murdoch e.a., "The Science of Motion," pp. 231-241.

54. Albert, qu. 1, 17, 1. art., 1.-5. concl., fol. 143$^{rb-va}$; vgl. Oresme, qu. 1, 20, 1. art., 1.-6. concl., ex istis, fols. 40$^{va}$-41$^{vb}$, pp. 166-170; Marsilius, qu. 1, 20, 1. art., 1.-6. concl., fols. 90$^{vb}$-91$^{rb}$.

Die Quaestionen 14-17 Alberts zum ersten Buch von *De generatione et corruptione* zeigen damit durchweg eine enge Anlehnung an Aussagen und Vorgehensweisen des Physikkommentars. Nun liegt dies insofern nahe, als sich die behandelten Gegenstände deutlich überschneiden; ähnliches kann man auch für die Fragen nach der Kontinuität der *augmentatio*, nach der Endlosigkeit der generationes[55] und für anderes vermuten. Jedoch repräsentieren alle genannten Probleme nur einen schmalen Ausschnitt aus den insgesamt 36 Quaestionen des Textes. In einem zweiten Schritt sollen deshalb noch für den Kontext von *De generatione* "typischere" Fragestellungen in den Blick genommen werden.

**Eigenständige Fragestellungen des *De generatione*-Kommentars**

Als im Kontext von De generatione wichtige Probleme können die Untersuchung von *generatio* und *mixtio* sowie der Elementeigenschaften gelten, denen Albert mindestens 12 der 21 Quaestionen des ersten und praktisch alle 15 Quaestionen des zweiten Buchs widmet. Sein Ausgangspunkt ist die von Buridan bezeichnenderweise erst als sechste Quaestio und von Oresme nur implizit behandelte Frage nach der Möglichkeit einer *generatio simpliciter dicta*, eines Entstehens im eigentlichen Sinne.[56] Diese Problemstellung beruht auf der Unterscheidung zwischen der *generatio simplex* und *secundum quid*, also zwischen Entstehen "an sich" und von bestimmten Momenten an einem zugrundeliegenden Seienden. Diese Begriffe gehen indirekt schon auf Aristoteles selbst zurück, auf Stellen im zweiten Kapitel des ersten Buchs von *De generatione* sowie im fünften Buch der Physik.[57] Albert referiert nach einer längeren Auseinandersetzung mit älteren Positionen den aristotelischen Standpunkt und leitet daraus die Möglichkeit beider Formen der *generatio* ab.[58] Wie betont, schließt er einige Überlegungen zu der Evidenz an, mit der wir diese *generationes* erkennen können. In Analogie zum Physikkommentar betont er, daß in der Naturphilosophie nicht die *evidentia summa* notwendig ist, sondern nur die *evidentia naturalis*, nach der wir uns aufgrund gewisser Anzeichen mehr für die

55. Albert, qu. 1, 13 und 2, 14; vgl. Oresme, qu. 1, 16 und 2, 10; Marsilius, qu. 1, 14 und 2, 18.
56. Albert, qu. 1, 1, fol. $132^{ra}2^{ra}$; vgl. Buridan, qu. 1, 6, fol. 132vb; Marsilius, qu. 1, 2, fol. $65^{vb}$; siehe weiter Ägidius, qu. 21-22, fols. $62^{ra}$-$63^{ra}$. Diese Frage behandelt durchgängig auch Oresme, qu. 1, 1, u.a. fol. $1^{rb}$ und $2^{ra}$, pp. 4 und 6; vgl. Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), p. 80*.
57. Aristoteles, 1, cap. 2, t.c. 10, 317a20-27, pp. 337 (dazu siehe jedoch Waterlow, *Nature, Change, and Agency*, p. 46); vgl. Averroes, p. 21; Thomas Aquinas, *In Aristotelis libros De caelo et mundo, De generatione et corruptione, Meteorologicorum expositio* (Spiazzi), 1, lect. V, 40, p. 340; Ägidius, fols. $10^{vb}$-$11^{ra}$. Zur Überlieferung des Begriffspaars im Kontext der Physik vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 245 und 248-249.
58. Albert, qu. 1, 1, 1. art., 1.-2. concl., fol. $132^{va}$; vgl. Oresme, qu. 1, 1, 3. art., 1. concl., fol. $2^{ra}$, p. 6; Marsilius, qu. 1, 2, 2. art., 1.-3. concl., fol. $66^{vb}$.

eine als für die andere Lösung entscheiden müssen.[59] Dieser Grad der Evidenz ist auch für *generatio simplex* und *secundum quid* ausreichend.

Gegenstand der beiden folgenden Quaestionen Alberts ist der Zusammenhang zwischen dem Entstehen und der Qualitätsveränderung.[60] Ganz wie in der Physik gefordert, müssen *generatio simplex* und *alteratio* streng geschieden werden, weil der ersteren im Gegensatz zur zweiten nur ein rein potentielles Seiendes, ein *ens in pura potentia*, zugrundeliegt und dabei die substantielle Form erst erzeugt werden muß.[61] Die *alteratio* kann zugleich aber als *generatio secundum quid* verstanden werden. Da Aristoteles überdies am Anfang von *De generatione* die Qualitätsveränderung mit der Erzeugung von Elementen auseinander verbunden hatte,[62] setzt für Albert wie für seine Zeitgenossen die *alteratio* die Möglichkeit der *generatio* voraus.[63]

Auch zwischen Entstehen und Vergehen besteht eine enge Beziehung, die Aristoteles im dritten Kapitel des ersten Buchs von *De generatione* formuliert hatte.[64] Nachdem Albert zwei mögliche Sichtweisen des Problems diskutiert hat, umreißt er die Grundlagen der Entscheidung des Philosophen: Insofern Materie nicht ohne eine substantielle Form existieren und insofern sie nur eine *forma substantialis* haben kann, gilt auch, *quod quando una forma substantialis corrumpitur*, alia generatur, "daß, wenn eine substantielle Form vergeht, eine andere entsteht."[65] Davon gelten jedoch einige Ausnahmen, so bei der

59. *Alia est evidentia naturalis, que est quibusdam verisimilibus magis ad unam partem quam ad aliam ...*, Albert, qu. 1, 1, 2. art., fol. 132$^{vb}$; vgl. Marsilius, qu. 1, 2, 3. art., fol. 66$^{vb}$. Buridan, qu. 1, 6, ultima dub., fol. 133$^{rb-va}$, unterscheidet zwischen *evidentia divina, angelica* und *humana*. Zur *evidentia naturalis* in den Physikkommentaren vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 89-90, 100-101, 103 und 108. Einen Anstoß für Alberts Überlegungen könnte eventuell Ägidius, qu. 2, fol. 52$^{ra-rb}$, *utrum quicquid apparet sensui sit verum*, gegeben haben.

60. Albert, qu. 1, 2, *utrum generatio sit alteratio*, fol. 132$^{vb}$, und qu. 1, 3, *utrum, si generatio esset impossibilis, alteratio esset impossibilis*, fol. 133$^{va}$; vgl. Buridan, qu. 1, 9, und 1, 4, fol. 135$^{va}$ und 131$^{rb}$; Oresme, qu. 1, 2-3, fol. 2$^{va}$ und 4$^{ra}$, pp. 10 und 17; Marsilius, qu. 1, 3-4, fol. 67$^{rb}$ und 68$^{rb}$.

61. Albert, qu. 1, 2, 1. art., concl., und 2. art., 1.-4. diff., fol. 133$^{ra-rb}$; vgl. Buridan, qu. 1, 9, 1.-3. concl., fols. 135$^{vb}$-136$^{ra}$; Oresme, qu. 1, 2, 1. art., concl., 1-4. diff., fol. 3$^{ra-rb}$, p. 12; Marsilius, qu. 1, 2, 1. art., 2. concl., und 2. art., 1.-4. diff., fol. 67$^{va-vb}$. Angeschlossen sind bei allen Überlegungen zur (übernatürlichen oder natürlichen) Möglichkeit von *mutationes* ohne Entstehen und Vergehen. — Zum Kontext der Physik vgl. Anm. 57; Albert referiert hierbei einen gängigen Standpunkt, vgl. z.B. zu Albertus Magnus: Hossfeld, "Grundgedanken," p. 193.

62. Aristoteles, 1, cap. 1, t.c. 1, 314b23-26, pp. 322; vgl. Averroes, pp. 7; Thomas von Aquin, 1, lect. II, 14, pp. 324; Ägidius, fol. 5$^{va-vb}$.

63. Albert, qu. 1, 3, 3. art., concl., fol. 134$^{va}$; vgl. Buridan, qu. 1, 4, 2. art., 1. concl., fol. 131$^{vb}$ (mit Einschränkungen); Oresme, qu. 1, 3, 2. art., 2. concl., fol. 5$^{ra}$, p. 21; Marsilius, qu. 1, 3, 3. art., concl., fol. 69$^{ra}$.

64. Aristoteles, 1, cap. 3, t.c. 17, 318a23-27, p. 346; vgl. Averroes, pp. 26-27; Thomas von Aquin, 1, lect. VIII, 57, p. 348; Ägidius, fol. 12$^{ra}$.

65. Albert, qu. 1, 4, 3. art., 4. concl., fol. 134$^{vb}$; ähnlich Buridan, qu. 1, 7, 2. art., ex quo, fol. 134$^{ra}$; Oresme, qu. 1, 6, tunc ad auctoritatem, concl., fol. 11$^{va}$, p. 50; Marsilius, qu. 1, 5, 2. art., concl., fol. 69$^{vb}$.

Ernährung eines Menschen, bei der die alte Form ohne Entstehung einer neuen zerstört wird. Wie Albert hervorhebt, habe Aristoteles die nur bedingt richtige Lösung an dieser Stelle vor allem deshalb vertreten, um die Beständigkeit des Entstehens und Vergehens beweisen zu können. Dieses Argument spielt auch an zwei weiteren Stellen eine Rolle, im achten Buch der Physik und am Ende des zweiten Buchs von *De generatione*.[66] Albert behandelt in bezug darauf ähnlich wie die anderen Kommentatoren seiner Zeit die Fragen, *utrum generatio sit perpetua* und *utrum in generationibus sit processus in infinitum*, "ob das Entstehen beständig ist" und "ob in den Vorgängen des Entstehens ein unendlicher Prozeß zu beobachten ist."[67] Beides ist grundsätzlich richtig, doch gelten einige Einschränkungen, die auf denselben theologischen Einwänden beruhen wie die Stellungnahme gegen die Ewigkeit der Zeit im Physikkommentar. Die Kennzeichnung der *generatio* als *perpetua* bezieht sich so nur auf die Welt nach der Schöpfung, da es davor keine Zeit gab, durch die man ein *semper et omni tempore finito* ("immer und für jede begrenzte Zeit") bestimmen könnte. Überdies muß man die Beständigkeit der generationes in dem Sinne verstehen, daß irgendetwas vor einiger Zeit entstanden ist und nach einiger Zeit entstehen wird, was nicht unbedingt einen kontinuierlichen Zusammenhang voraussetzt.[68]

Auch für die Behandlung der generatio spielt somit der Physikkommentar eine gewisse Rolle, selbst wenn der Ansatzpunkt der Kommentierung immer durch die direkte aristotelische Vorlage gegeben ist. Ähnliches gilt für die Diskussion der Mischung, in der Albert zunächst ein Verbleiben der Form der Elemente im mixtum ablehnt.[69] Dabei bleibt er anders als Buridan in seinen Überlegungen zur Form des *mixtum* relativ unbestimmt, indem er zwar nach der Vorstellung älterer Meinungen die gängige Lösung präsentiert, sie aber zugleich durch einige *dubia* in Frage stellt — ein Verfahren, das er auch in der Diskussion der Qualitätsveränderung im fünften Buch seines Physikkommentars anwendet.[70] Dies setzt sich in der folgenden Quaestio 1, 20 fort, *utrum mixtio sit possi-*

66. Für *De generatione* siehe Aristoteles, 2, cap. 10, besonders t.c. 55 und 58, 336a15-18 und b25-26; für die Physik und den Zusammenhang zur Debatte um die Ewigkeit der Welt vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 344-356.
67. Albert, qu. 2, 12 und 2, 14, fol. 153$^{va}$ und 154$^{va}$; vgl. Buridan, qu. 2, 13-14, fol. 155$^{vb}$ und 156$^{rb}$; Oresme, qu. 2, 14, fol. 72$^{va}$, p. 286 (Alberts zweite Frage ist dort nur implizit behandelt); Marsilius, qu. 2, 16 und 2, 18, fol. 123$^{rb}$ und 127$^{rb}$.
68. Albert, qu. 2, 12, 3.-4. dist., und 3. sensum, concl., fol. 153$^{va-vb}$; vgl. Oresme, qu. 2, 14, 1. art., 4.-5. dist., und 2. art., 3. intell., 2. concl., fols. 72$^{vb}$-73$^{va}$, pp. 287 und 289.
69. Albert, qu. 1, 19, fol. 144$^{vb}$ (eine englische Übersetzung mit Anmerkungen bei Grant (ed.), *A Source Book*, pp. 605-613); vgl. Buridan, qu. 1, 22, fol. 144$^{ra}$; Oresme, qu. 1, 5, fol. 7$^{ra}$, p. 32; Marsilius, qu. 1, 22, fol. 94$^{ra}$.
70. Dazu vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 257-271; zur hier angesprochenen Lösung siehe Maier, *Grenze*, pp. 134-135 (die auch auf Bezüge zur anderen, hier nicht behandelten Fassung des Buridanschen *De generatione*-Kommentars hinweist); zu Oresmes Beschreibung der *mixtio* vgl. Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), pp. 139*-158*.

*bilis*, "ob Mischung möglich ist,"[71] in der er unter anderem schon von Oresme vorgetragene problemata zu einer eindrucksvollen Liste zusammenfaßt. Die Antworten geraten dann jedoch zu einer Präzisierung des Mischungsprozesses. So betont Albert zur Frage, *qualiter fiat mixtio*, "wie Mischung vor sich geht," daß die vermischten Stoffe in kleinsten Teilen aufeinander einwirken, solange bis die substantiellen Formen der Elemente vergangen sind und dann die *forma substantialis* des gemischten Körpers aus diesen Teilen in die gesamte Masse — im scholastischen Sinne[72] — "induziert" werden kann.[73]

Eines der negativen Eingangsargumente zu dieser Quaestio lautete, daß Mischung schon deshalb nicht möglich sei, weil sie entweder natürlich oder gewaltsam sein müsse, aber keines von beiden zutreffe.[74] Im Anschluß daran setzt sich Albert unabhängig von Buridan und Oresme mit dieser aus der Physik entlehnten Problematik in einer eigenen Quaestio auseinander.[75] Wie sehr er sich damit von *De generatione* löst, macht die Tatsache deutlich, daß er für die positive Entscheidung nicht auf ein Diktum des Philosophen, sondern nur auf dessen Diskussion der Mischung unter den natürlichen *transmutationes* hinweisen kann. Seine Ergebnisse fallen auch recht differenziert aus: Insofern eine gewaltsame Veränderung über den allgemeinen Lauf der Dinge in der Natur hinausgeht, gibt es eine *mixtio violenta*, nämlich die künstlich herbeigeführte Mischung von Metallen.[76] Definiert man die Gewaltsamkeit durch die Überwindung der natürlichen Neigung des Veränderten und Mischung als die Erzeugung der Form des *mixtum*, so ist keine Mischung gewaltsam. Dies ändert sich, wenn man unter Mischung die Qualitätsänderung vor der Erzeugung der Form versteht; weil die *alteratio* gegen den Widerstand des *passum*

71. Albert, qu. 1, 20, fol. $145^{vb}$ (ein Auszug in engl. Übersetzung bei Grant (ed.), *A Source Book*, pp. 613-614); vgl. Buridan, qu. 1, 23, fol. $145^{rb}$; Oresme, qu. 1, 19, fol. $37^{va}$, p. 157; Marsilius, qu. 1, 23, fol. $95^{vb}$.
72. Zum Problem der *quantitas materie* siehe Maier, *Die Vorläufer Galileis*, pp. 26-52; Weisheipl, " The Concept of Matter," pp. 165-168, u.ö.; Leff, *Gregory of Rimini*, pp. 140-141.
73. Albert, qu. 1, 20, 3. art., 1. probl. ; ähnlich Oresme, qu. 1, 19, 2. art., tunc, 1. probl., fol. $38^{ra-rb}$, pp. 158-159; Marsilius, qu. 1, 23, 2. art., 1. dub., fol. $96^{rb-va}$; bei Buridan, qu. 1, 23, opp., 2. modus, fol. $145^{va}$, in den ersten Distinktionen. — Auf der Grundlage der Überlegungen bei Aristoteles, 1, cap. 10, t.c. 85, 327b31-328a5, p. 535 (dazu Sambursky, *Das physikalische Weltbild*, pp. 194-195, und Waterlow, *Nature, Change, and Agency*, pp. 83-87); vgl. Averroes, pp. 89-90; Ägidius, fol. $28^{va-vb}$; Thomas Sutton, pp. 111-112. Zu Albertus Magnus siehe Hossfeld, "Grundgedanken," pp. 197-198; zu Gregor von Rimini: Leff, *Gregory of Rimini*, pp. 141-144.
74. Albert, qu. 1, 20, quod non, 4., fol. $145^{vb}$; am Ende mit dem Hinweis auf die folgende Quaestio beantwortet. — Zum Zusammenhang der Physik vgl. u.a. Murdoch e.a., "The Science of Motion," pp. 211; Weisheipl, "The Interpretation," pp. 529; Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, bes. pp. 253-254, 359-360, 364-365, 368-372, 396-399.
75. Albert, qu. 1, 21, fol. $146^{rb}$; vgl. Marsilius, qu. 1, 24, fol. $97^{rb}$.
76. *De generatione* lieferte schon für das 13. Jahrhundert auch den philosophischen Hintergrund für alchemistische Prozesse, vgl. Newman, "Technology and Alchemical Debate," p. 436 (zu Paul von Tarent).

abläuft — anders käme sie im Sinne des fünften Buchs der Physik nicht zustande — erhält der Prozeß einen gewaltsamen Charakter.[77]

Der dritte wichtige Themenbereich von *De generatione*, die Elementenlehre, wird von Albert in weitgehend konventioneller Weise behandelt. Nachdem er unter anderem die Zahl der Primärqualitäten und der Elemente bestimmt und diese einander zugeordnet hat, fragt er in Quaestio 2, 6 nach der Existenz von reinen Elementen, *utrum sit aliquod elementum purum*.[78] Neben der Autorität des Philosophen[79] verweist er für die positive Entscheidung wiederum auf die Begriffe natürlich und gewaltsam: Ein unreines Element wäre einer unnatürlichen und damit gewaltsamen *dispositio* ausgesetzt, die die sonst angenommene Beständigkeit der Elemente ausschliessen würde. Gegen die positive Annahme spricht jedoch die Erfahrung, daß uns die Elemente gewöhnlich nicht in reiner Form begegnen, und die von einigen Autoren wie z.B. indirekt auch bei Macrobius[80] vertretene Auffassung, daß es keine eigene Sphäre des Feuers gebe. Ähnlich wie schon in der Physik[81] verweist Albert dagegen auf die Notwendigkeit eines vierten Elements bei der Kombination der Elementarqualitäten, auf das Aufsteigen des Feuers im irdischen Bereich und das Verglühen der *exhalationes* wie der Kometen in großer Höhe.[82] Unabhängig davon trifft es jedoch zu, daß die reinen Elemente im Falle von Erde und Feuer nur in den äußeren Bereichen ihrer jeweiligen Orte, bei Luft und Wasser sogar nur "zwischendurch," eher zufällig an einzelnen Orten, angetroffen werden können.[83]

In der folgenden Quaestio 2, 7 beschäftigt sich Albert mit der von Aristoteles postulierten Umwandlung der Elemente ineinander.[84] Dabei rückt bei ihm

77. Albert, *ibid.*, 2. art., 1.-3. concl., fol. 146$^{vb}$. Marsilius, *ibid.*, 2. art., 1.-3. concl., fol. 97$^{va-vb}$, vertritt im dritten Schluß die gegenteilige Auffassung und läßt Albert gewissermaßen in einem *dubium* "zu Wort kommen"; er hat überdies weitere Schlüsse. — Bei Raimundus Lullus entsteht dagegen Widerstand erst beim Versuch, die "vermischten" Elemente wieder zu trennen, vgl. Duhem, *Le système du monde*, p. 530.
78. Albert, qu. 2, 6, fol. 150$^{ra}$; vgl. Oresme, qu. 2, 6, fol. 57$^{ra}$, p. 225; Marsilius, qu. 2, 8, fol. 111$^{ra}$.
79. Wahrscheinlich zu Aristoteles, 2, cap. 3, t.c. 22, 330b30-331a3, p. 546; vgl. Averroes, p. 110; Ägidius, fol. 34$^{rb-va}$.
80. Wohl in bezug auf seinen Kommentar zum *Somnium Scipionis* Ciceros; zu diesem vgl. u.a. Thorndike, *A History of Magic*, Bd. 1, pp. 544-545. Albert, qu. 2, 6, 1. art., nihilominus, fol. 150$^{va}$, zitiert ihn mit der Feststellung, *quod in concavo orbis lune est aer purior* ... , wohl übernommen von Oresme, qu. 2, 6, iterum, fol. 58$^{rb}$, p. 229 (dort: *quod prope luna est purior pars aeris* ... ); vgl. auch Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), pp. 177*-78*.
81. Dazu siehe Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 193-196.
82. Albert, qu. 2, 6, 2. art., 1. concl., fol. 150$^{va}$; vgl. Oresme, qu. 2, 6, tunc, 1. concl., fol. 58$^{rb-va}$, p. 230.
83. Albert, *ibid.*, 2.-3. concl., fol. 150$^{va-vb}$; etwas anders bei Oresme, qu. 2, 6, tunc, 2.-3. concl., fol. 58$^{vb}$, p. 230. Für eine andere Lösung vgl. Marsilius, qu. 2, 8, 2. art., 3.-4. concl., fol. 111$^{vb}$; für die Anwendung von Gradrechnung für die Reinheit vgl. Thorndike, *A History of Magic*, Bd. 3, pp. 130-131.
84. Albert, qu. 2, 7, fol. 150$^{vb}$; vgl. Oresme, qu. 2, 7, fol. 59$^{rb}$, p. 233; Marsilius, qu. 2, 9, fol. 112$^{rb}$.

wie bei Marsilius die Kontinuität dieses Prozesses in den Mittelpunkt. So stellt er unter anderem fest, daß jeder Teil — wohl wieder im Sinne der *partes proportionales* — einer bestimmten Menge eines Elements sich kontinuierlich in ein anderes verwandeln lasse. In der an Überlegungen aus der Physik orientierten Beweisführung begründet er dies unter anderem mit der Gegensätzlichkeit der Elemente. Die Umwandlung kann jedoch nicht vollständig sein, denn sonst käme es zu einer "Unordnung" im Universum (*inordinatio universi*) und eventuell zu einem Vakuum.[85]

Den Abschluß der Quaestionen zu *De generatione* bildet ein Brückenschlag zu *De caelo*, der sich in dieser Form weder bei Oresme noch bei Marsilius findet: Albert beschäftigt sich in der letzten Quaestio zum zweiten Buch mit der kosmologischen Kausalität des Entstehens und Vergehens und fragt, *utrum cessante motu celi cessarent generationes et corruptiones istorum inferiorum*, "ob mit dem Aufhören der Himmelsbewegungen auch die Prozesse des Entstehens und Vergehens der irdischen Dinge aufhören würden."[86] Er bezieht sich dafür auf die von Aristoteles am Ende des zweiten Buchs geknüpfte Verbindung zwischen den Himmelsbewegungen und den irdischen Veränderungen[87] und nennt die drei "gängigen" Möglichkeiten himmlischen Einflusses auf die irdischen Körper: durch Bewegung, Licht und eine nicht genauer bestimmte *influentia*.[88] Wie z.B. das Feuer in seiner Sphäre werden auch andere Dinge im sublunaren Bereich durch Himmelsbewegungen mitgezogen; das Licht der Himmelskörper wirkt erwärmend auf die irdischen Dinge; schließlich werden unter der Erde, dort, wo weder Bewegung noch Licht hingelangen, durch den himmlischen Einfluß bestimmte Metalle erzeugt.[89] Daraus ergibt sich die Wirkung des Ausfalls der Himmelsbewegungen: Bei einem völligen Stillstand kämen auch die irdischen Prozesse zum Erliegen; fiele einer der Faktoren aus, träten unterschiedliche Veränderungen auf. Besondere Aufmerksamkeit widmet Albert dabei der auch

— Grundlage ist Aristoteles, 2, cap. 4, t.c. 24, 331a8-11, pp. 549 (zum Kontext siehe Verdenius e.a., *Aristotle on Coming-to-be and Passing-away*, pp. 57-64); vgl. Averroes, pp. 111-112; Ägidius, fol. 35$^{ra}$.

85. Albert, qu. 2, 7, 3. concl., dub., fol. 151$^{rb}$; vgl. Marsilius, qu. 2, 9, 2. art., 3. concl., fol. 113$^{rb}$. Die bei Albert erwähnte "Maßein-heit" ist der (Kubik-)Fuß; neben dem Problem der Kontinuität von Bewegungen bildet die Vorstellung des "innerweltlichen" Vakuums (d.h. unterhalb der Mondsphäre) einen Hintergrund der Überlegungen.

86. Albert, qu. 2, 15, fol. 155$^{ra}$; vgl. Buridan, qu. 2, 14, fol. 156$^{rb}$, mit stark abweichender Behandlung. Oresme sieht dagegen (im Zusammenhang mit der Ablehnung der Astrologie) in den Ausführungen von *De generatione* eine Begründung von Entstehen und Vergehen vor allem durch die vier Elemente und die vier Primärqualitäten, nicht durch die Sterne, Thorndike, *A History of Magic*, Bd. 3, p. 408; vgl. auch Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti), p. 199*.

87. Aristoteles, 2, cap. 11, t.c. 69, 338a17-b1, pp. 580; vgl. Averroes, pp. 160: *Et quia ostensum est in aliis, quod motus circularis et eternus est motus celi, manifestum est, quod motus rerum generatarum et corruptarum est propter illos motus et ex eis ...* ; Ägidius, fol. 49$^{va}$.

88. Allgemein vgl. Grant, "Cosmology," pp. 288-290.

89. Albert, qu. 2, 15, in opp., sciendum, fol. 155$^{ra-rb}$.

in der Physik und in *De caelo* zentralen Ortsbewegung der Himmelskörper.[90] Ohne sie würden zwar die Prozesse im sublunaren Bereich weitergehen, die vom Licht und der *influentia* ausgelöst sind, doch bliebe nichts wie vorher. Dies gälte schon für eine Reduzierung auf die tägliche Himmelsbewegung, bei der nur der Unterschied zwischen Tag und Nacht beobachtet werden könnte, nicht mehr aber die durch die Annäherung und Entfernung der Sonne verursachten Jahreszeiten. Überhaupt wäre die völlige Gleichförmigkeit des Himmels und seiner Bewegung das Ende aller Veränderungen, denn diese setzen — mit einer von Buridan in anderem Zusammenhang betonten Formulierung[91] — ein stetes Sich-Anders-Verhalten, ein *aliter et aliter se habere*, der Himmelsbewegung voraus.[92] Mit der Diskussion der kosmologischen Kausalität geht Albert somit weit über den Kontext von De generatione hinaus.

Die hier vorgelegte Auswahl von Quaestionen ist sicher willkürlich und repräsentiert nur einen Ausschnitt aus den Lösungen Alberts von Sachsen zu De generatione. Trotz dieser Einschränkung ergeben sich daraus recht deutlich drei Thesen, die wahrscheinlich mindestens partiell für alle Kommentare der "Pariser Schule," vielleicht auch für weitere Autoren des 14. Jahrhunderts gültig sind:

1. Die Kommentierung und Auslegung des aristotelischen *De generatione* orientiert sich in starkem Maße an der Vorstellung der Einheit der aristotelischen Lösungen.
2. Neben der direkten Vorlage nimmt für die Argumentation die aristotelische Physik schon wegen der Allgemeinheit ihrer Fragestellungen einen hervorragenden Platz ein. Dabei werden auch, sofern nötig und möglich, die neuen Lösungen der Physikkommentare des 14. Jahrhunderts berücksichtigt.
3. Wahrscheinlich auch als Folge des scholastischen Lehrbetriebs[93] ergibt

**90.** Genauer des primum mobile, vgl. u.a. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 374-375.

**91.** Im Zusammenhang der Diskussion des Charakters der Bewegung, vgl. *ibid.*, p. 138, zu Anm. 46.

**92.** Albert, qu. 2, 15, 1.-6. concl., fol. 155$^{rb}$: (1) *Si celum cessaret a quolibet istorum trium, scilicet a motu, lumine et influentia, nulla fieret actio in istis inferioribus* ... (2) *Si celum cessaret a motu solum et non a lumine et influentia, non propter hoc cessarent actiones in istis inferioribus* ... (3) *Si celum non moveretur nisi unico motu, scilicet motu diurno, adhuc fierent generationes et corruptiones* ... (4) *Adhuc, quod fiant generationes et corruptiones, sicut modo fiunt, requiruntur duo motus, scilicet motus diurnus et obliquus, scilicet planetarum* ... (5) *Si celum esset uniforme in suis partibus et moveretur, nihil de cetero generaretur* ... (6) *Si celum cessaret a lumine et influentia, non aliud faceret in istis inferioribus, nisi quod moveret speram ignis circulariter* ... — Für die besondere Rolle der Sonne bei Albertus Magnus siehe Hossfeld, "Grundgedanken," p. 202; allgemein dazu auch Thorndike, *History*, Bd. 2, pp. 582-583.

**93.** Für die Stellung von *De generatione* im Curriculum der Pariser und der Oxforder Universität vgl. Leff, *Paris and Oxford Universities*, pp. 138-160; wenn es überhaupt im Kanon der (fakultativ) zu lesenden Schriften erschien, dann erst hinter der Physik und anderen aristotelischen Texten. Vgl. auch Lohr, "The Medieval Interpretation of Aristotle," p. 85; Weisheipl, "The Interpretation," pp. 523, 526-527.

sich so eine Unterordnung von *De generatione* unter die Physik, die sich bei Albert möglicherweise bewußt im Verzicht auf eine "wissenschaftstheoretische" Eingangsfrage äußert.

Diese Unterordnung läßt sich bei Albert mit großer Wahrscheinlichkeit auch in der Chronologie seiner Schriften fassen, denn der Physikkommentar stand wohl am Anfang seiner Vorlesungen an der Artistenfakultät der Pariser Universität.[94] Angesichts der engen Beziehungen zwischen diesem Text und den Kommentaren zu *De caelo* und *De generatione* hat Albert diese aristotelischen Schriften wohl kurz nacheinander in der ersten Hälfte der fünfziger Jahre des 14. Jahrhunderts kommentiert.

Die wohl gerade bei Albert von Sachsen besonders deutliche Tendenz, *De generatione* zu einer Art Anhang der Physik werden zu lassen, mag man als Zeichen seiner mangelnden Fähigkeit zu großen philosophischen Konzeptionen empfinden. Vielleicht ist sie aber auch die unmittelbare Folge seines ausgeprägten Ordnungssinns. Auf jeden Fall bieten Alberts Quaestionen zu *De generatione* ein gutes Beispiel für das Nebeneinander von weiteren und engeren Ansätzen in der scholastischen Kommentierung der aristotelischen Naturphilosophie.

94. Zur Datierung einiger Texte Alberts vgl. Sarnowsky, *Die aristotelisch-scholastische Theorie der Bewegung*, pp. 49-54.

# "Generatio potest auferri, non differri." Causal Order and Natural Necessity in Nicole Oresme's *Questiones super De generatione et corruptione*

*Stefano Caroti*

In book 1, questions 9 and 10 of his commentary on *De generatione et corruptione*, Nicole Oresme raised the problem of the principles of individuation of natural beings. These questions have parallels in the commentaries on *De generatione et corruptione* by Albert of Saxony and Marsilius of Inghen. All these authors refer to two ways in which this problem can be studied: first, by considering only the causal chain (that is, by investigating whether a natural being could be produced by an agent different from that by which it has actually been produced), and second, by taking into account both causal chain and time (that is, by examining whether a natural thing could be produced at a different time than that at which it has actually been produced).[1]

Oresme's principal thesis in question 9 is that natural events belong to a fixed causal order which maintains its constancy despite its complete contingency with regard to God's will. Oresme allows only for local and partial infringements on this order. His effort to individuate natural beings through time relies at least partially on Scotus' notion of *possibilitas logica*. On the basis of this notion, Oresme attributes to every natural potency a precise temporal qualification, and, at the same time, avoids rigid determinism with respect to natural events.

In question 10, Oresme, otherwise the harshest critic of astrology in the Middel Ages,[2] is forced to appeal to astral influences so as to establish the uniqueness of any given natural event; he makes, however, no mention of the

1. Oresme in the ninth and tenth *questio* ("Utrum, dato aliquo generabili, ⟨illud⟩ possit a quolibet plurium agentium generari" and "Utrum, dato aliquo generabili, illud in quolibet plurium instantium possit generari"), Albert of Saxony in the seventh and eighth and Marsilius of Inghen in the eighth and ninth. For Oresme see Nicolaus Oresmius, *Quaestiones super De generatione et corruptione* (Caroti); for Albert and Marsilius I rely upon the editions Albertus de Saxonia, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505) and Marsilius de Inghen, *Quaestiones in libros De generatione et corruptione* (Venezia, 1505) at fols. 136$^{rb}$-137$^{va}$ and 73$^{ra}$-75$^{rb}$.
2. Caroti, *La critica*.

possible incommensurability of celestial motions, an argument which he uses elsewhere for a similar purpose.[3]

The philosophical purport of these questions is not hard to see. It is much more difficult, however, to set them in a precise historical context, both because we cannot establish with due precision the date of Oresme's commentary on *De generatione et corruptione*, and because we are insufficiently familiar with contemporaneous discussions. There are some clues, however, as to the historical circumstances under which Oresme composed his commentary.

In one passage of his commentary, Oresme hints at God's potency to interfere with the past, which was a much debated issue in the years 1340 – 1350 at Paris. From the context it is clear that it is a sensitive topic. Perhaps this hint echoes the Parisian condemnations of 1347 relating to this issue.[4] If true, then this passage may help to date Oresme's commentary with greater precision.

The intellectual background of Oresme's discussion on individuation is furnished, I believe, by John Buridan's commentary on *De generatione et corruptione*. In question 10 of book 1, Oresme briefly refers to the problem of the regeneration of what has been corrupted. He claims that if a natural thing could be produced at a different time than the moment at which it has actually been produced, it would follow that a corrupted thing could be regenerated. Albert of Saxony and Marsilius of Inghen invoke the same reference.[5]

Buridan, on the other hand, addresses the problem of individuation precisely in his *questio* on whether a corrupted thing can be regenerated in a numerically identical form (*utrum quod simpliciter corrumpitur possit reverti idem in numero*). Unlike Nicole Oresme, Albert of Saxony and Marsilius of Inghen, he does not devote two separate *questiones* to the principle of individuation and its related problems of necessity and contingency. Rather, Buridan harks back on a thirteenth-century tradition of discussing individuation in the context of the cyclical course of generations and corruptions.[6] Oresme can thus be credited with having introduced the discussion on individuation into the first book, at

3. The objective is to prove that celestial phenomena like conjunctions and planetary aspects cannot take place twice in an identical configuration, and thereby to destroy the astrological rules for forecasting the future; see Grant, *Nicole Oresme*.
4. Courtenay, "John of Mirecourt and Gregory of Rimini." See also Courtenay, "John of Mirecourt's Condemnation." See also Caroti, "Notes."
5. "Oppositum arguitur, quia si ita esset, sequitur quod corruptum iterum posset generari, verbi gratia Cesar," Oresme, p. 79; "in oppositum arguitur, nam si questio esset vera, sequitur quod corruptum posset iterum generari," fol. 137$^{ra}$ for Albert; "oppositum arguitur. Primo sequeretur quod idem effectus posset bis generari," fol. 74$^{va}$ for Marsilius. Only Marsilius, like Buridan, discusses the *questio* "Utrum corruptum possit reverti idem numero" in the last question on the second book. On this *questio* see n. 86 and Braakhuis, "John Buridan."
6. The philosophical context of the discussion is the cyclical course of generations and corruptions (*De gen.*, II, 11, 338a4-b5). In the commentary of Gilles of Orléans a *questio* on the second book is devoted to ascertaining "Utrum redeuntibus corporibus ad eundem situm supracelestibus in quo sunt nunc oporteat istum mundum redire similem quantum ad omnes suas operationes," see MS Paris, Bibliothèque Nationale, lat. 15805, fol. 36$^{va}$.

least in the Parisian commentary tradition on *De generatione et corruptione* after Buridan. Very likely, his move was provoked by Buridan's discussion, with which he disagrees.

In what follows, I shall discuss Oresme's views on individuation as developed in questions 9 and 10 of book 1. In addition, I shall also examine the related notions of contingency and necessity, which Oresme discusses most explicitly in question 3 of book 1.[7] Whenever the occasion arises, I shall refer to Albert's and Marsilius' *Questiones super libros De generatione et corruptione*, whose resemblance with Oresme's is not merely structural.

## The *questio* "Utrum dato aliquo generabili, ⟨illud⟩ possit a quolibet plurium agentium generari"

In this question, concerning causal order, Oresme tries to establish a rule for numerically distinguishing (*secundum numerum*) natural effects whose causes either belong to the same species or have a similar power.

In the series of *pro*-arguments in the opening section of the question, the problem is tackled from both possible points, that is, either from the effects or from the causes. Starting from the former, Oresme invokes a principle according to which:

> idem effectus numero potest fieri a multis, quorum quilibet potest per se ipsum effectum producere totaliter, ergo talis effectus potuisset indifferenter totus produci a quolibet illorum agentium.[8]

Some of the arguments of this first section are nothing but instances of this principle. It is interesting to note that they are drawn from different types of effects according to Aristotle's categories. As far as substance is concerned, the same chick can be brooded by two different hens,[9] and the same corpse can be produced by different agents;[10] in the category of quality, the same heat can be induced by different fires,[11] the same sensation can be exactly ascribed to

7. Oresme in the third *questio* on the first book ("Utrum si generatio erit impossibilis, alteratio erit impossibilis"), Albert again in the third and Marsilius in the fourth. For Buridan I quote from version B preserved in the Berlin MS, *questio* I, 4: "Utrum sequitur: impossibile est elementa generari substantialiter ergo impossibile est ea alterari," fol. 131$^{b}$. I have read version B of Buridan's commentary in MS Berlin, Staatsbibliothek, Preußischer Kulturbesitz, lat. fol. 387 and version A in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097. For the different versions of Buridan's commentary see Michael, *Johannes Buridan*, II, pp. 631-648.
8. "Consequentia est nota de se, antecedens patet de ligno in quo potest causari ignis a duobus ignibus, ergo quilibet istorum potuisset comburere lignum et eundem ignem generari," Oresme, p. 70. Albert and Marsilius mention in their arguments only the example of fire, see arg. 2, fol. 136$^{rb}$ for Albert, and arg. 3, fol. 71$^{rb}$ for Marsilius.
9. In Oresme's commentary this example is to be found only in the answer to the *pro*-argument, in the final section of the *questio*; it is, however, to be found in Albert (arg. 1, fol. 136$^{rb}$) and Marsilius (arg. 4, fol. 73$^{rb}$).
10. Oresme arg. 4, p. 70; Albert arg. 4, fol. 136$^{rb}$; Marsilius arg. 5, fol. 73$^{rb}$. This example is to be found, in a different context, in the tenth arg. of Oresme's commentary, see n. 30 and 32.
11. Oresme arg. 3, p. 70; Albert arg. 3, fol. 136$^{rb}$; Marsilius arg. 2, fol. 73$^{rb}$.

two similar objects and the same *intentio communis* to two things belonging to the same species;[12] finally, the same motion can be produced by Socrates and Plato.[13]

Oresme relies clearly upon the Aristotelian principle *ex eodem idem*, according to which the set of causes and their effects must be related to the same species. The generic assumption of this principle seems to prevent one from establishing a rule for numerically distinguishing the members of the same species.[14]

If one starts from a different point in the causal chain, the fact that an effect can be produced by agents even of different species (for instance, a fire can be lit by another fire, by the sun, by decomposing matter, or by friction) apparently prevents one from establishing a criterion for the numerical distinction of natural beings through the causal chain.[15]

The instrumental character of every kind of cause in comparison with the first cause, God,[16] is another strong argument against this criterion, because, given the secondary role attributed to natural causes, it is difficult to state precisely their real contribution to effects of which they are only mediate cause. (We shall see in the final remarks that Buridan in his commentary on *De generatione* relies ultimately upon God to grant an individuating principle for natural beings). Since an agent can have more than one end, one is entitled, moreover, to conclude that an effect can spring from different causes.[17] Efficient and final causes are considered to belong to external causality (*cause extrinsece*). Such a distinction does not allow that the rule for individuating natural beings is based on efficient causes,[18] just because of their external nature.

These arguments are recorded in Oresme's, Albert's and Marsilius' commentaries. Two different, weaker, arguments are to be found only in Oresme: the first, which resorts to *ex simili* reasoning, extends to generation some features peculiar to corruption ("possibile est idem corrumpi a pluribus corrumpentibus,

12. Oresme arg. 6 and 5, pp. 70-71; Albert arg. 6 and 5, fol. 136$^{rb}$; Marsilius arg. 6 and 7, fol. 73$^{rb}$.
13. This argument (8, p. 71) is to be found only in Oresme.
14. The right interpretation of this principle is dealt with in other works by Oresme; for *Quodlibeta* see Caroti, "Eléments."
15. "Ex variatione specifica agentium non sequitur diversitas specifica effectuum, igitur nec similiter ex diversitate numerali," p. 71; Albert arg. 7, fol. 136$^{rb}$; Marsilius arg. 8, fol. 73$^{rb}$. Here, as in most arguments, Oresme uses the *consequentia*; in this case the *locus* is that *ex simili*. See Hugonnard-Roche, "Logique."
16. In Oresme's commentary, this argument is to be found only in the replies to this first sequence of *pro*-arguments; Albert (arg. 8, fol. 136$^{rb}$) and Marsilius (arg. 11, fol. 73$^{rb}$) mention it also among the *pro*-arguments. Only Marsilius presents an argument that appeals to the possibility that the same matter can be the subject of different beings, relying on the similitude with wool, which can be used for different cloths (arg. 12, fol. 73$^{rb}$).
17. Oresme arg. 1, p. 70; Albert arg. 9, fol. 136$^{rb-va}$; Marsilius arg. 9, fol. 73$^{rb}$.
18. Oresme arg. 9, p. 71: "nono, cause extrinsece non faciunt ad diversitatem effectus; modo agens est causa extrinseca igitur idem effectus potest fieri ex diversis agentibus." Albert arg. 8, fol. 136$^{rb}$; Marsilius arg. 10, fol. 73$^{rb}$.

igitur similiter generari a pluribus per simile, quia omnis corruptio unius est generatio alterius").[19] A cursory allusion to determinism is contained in the second argument, both in the *pro*-argument of its opening section[20] and in the final answer, where Oresme makes a clear distinction between necessary and essentially ordered (*essentialiter ordinate*) causes.[21]

The *questio*'s central section is devoted to a solution that appears in very similar form in Oresme's and Albert's commentaries; Marsilius departs from the position of his older colleagues, criticising it openly as the *communis modus respondendi*.[22]

Oresme and Albert use the *distinctiones* following the *in oppositum* argument in order to state the meaning of "*extrinsecus*" related to efficient causality. An agent's actual influence on the effect is not excluded by this qualification, and it must be noted that both solve the problem according to the presence or the absence of such an influence on the effect. Among the efficient causes only the merely instrumental ones can be defined as external, because their action does not affect a thing's substantial components:

> secunda distinctio: quod quedam sunt agentia improprie, quia nihil influunt in effectum, sed alia sunt agentia proprie, que aliquid influunt in effectum. Tertia distinctio: quod de non influentibus quedam sunt mere instrumentalia, ut sunt malleus vel securis; alia sunt quasi occasionalia, sicut est agens consilians vel applicans.[23]

Oresme analyses also the role of the internal causes — that is matter and form — whose changes greatly contribute to the numerical distinction of natural being

19. Arg. 10, p. 71.
20. "Ultimo, si Sortes generatus a Platone non potuisset generari ab aliquo alio, sequitur quod haberet ordinem essentialem ad ipsum Platonem, et similiter Plato ad suum patrem, et sic esset processus in infinitum in causis essentialiter ordinatis ... Patet consequentia, ex quo impossibile est Sortem ab alio generari, tunc necesse fuit quod generaretur a Platone, si debuit generari, igitur ibi fuit ordo necessarius et essentialis; et sic in essentialiter ordinatis, ut dictum est, esset processus in infinitum, quod est falsum et contra Aristotelem," p. 72.
21. "Ad ultimam, cum dicitur quod tunc essent cause essentialiter ordinate, dico quod hoc non sequitur: cause sunt necessario ordinate, ergo sic sunt essentialiter ordinate, quia per hoc quod est essentialis ordo denominatur plus quam quod sit necessarius, scilicet quod cause sint coagentes tempore et sint subordinate sic quod una agat in virtute alterius et non aliter," p. 77.
22. To Oresme's and Albert's distinction between *causa influens* and *causa non influens*, Marsilius prefers the distinction between *causa per se* and *causa per accidens*. In his *Quodlibeta*, however, Oresme only uses the latter distinction.
23. Oresme, p. 72. Not every instrumental cause can be considered an improper one; the subordination of the entire *ordo causalis* to God's will would cast doubt upon every kind of natural inquiry if a certain influence were not recognized for these causes, irrespective of their dependence on the first cause. Oresme resorts also to the distinction between *cause separate* and *cause coniuncte* or *essentialiter ordinate* to affirm the active role of natural causes: "quarta distinctio: quod quedam sunt influentia que quodammodo sunt instrumentalia, quia influunt in virtute alterius, sicut sunt cause agentes subordinate preter primam, sed ipsa prima sic est influens quod nullo modo est instrumentalis. Unde nota quod instrumentalis quedam est separata sicut malleus qui nihil influit, alia instrumentalis coniuncta vel essentialiter ordinata cause prime, sicut est calor vel forma ignis, et iste cause influunt in effectum," pp. 72-73. For Albert fol. 136$^{va}$. Such a discussion can be found also in *Quodlibeta*; see Caroti, "Eléments," pp. 90-93.

within the same species. In the two conclusions concerning matter and form, he stresses with singular emphasis the part played by matter, which seems to be a stronger individuating principle than form:

> quantum ad secundum, sit prima conclusio: quod ad variationem materie sequitur diversitas effectus ... Secunda conclusio: quod etiam ex variatione materie sequitur diversitas forme ad sensum quod dictum est, ita quod ista forma, que educitur de potentia huius materie, non potuit educi de alia materia.[24]

In the final solution, however, the influence of the agent on the effect is considered more relevant than the essential components of substance taken separately; since this influence can be attributed mainly to the form — the only active principle —, we can assume that both have an equal weight as individuating principles.

These two conclusions are followed in Oresme's, Albert's and Marsilius' commentaries by a series of corollaries (although Albert does not use the term *correlaria*) where the problem of a natural being's numerical distinction is openly connected with determinism:

> ex hoc infero correlarie quod Sortes non potuit generari ex aliqua alia muliere quam ex matre sua ... correlarium secundum est quod Sortes non potuit generari alia hora a suis parentibus nisi illa in qua generatus fuit ... Ex hoc patet correlarie quod anima Sortis vel Brunelli non potest alicuius alterius esse.[25]

The authors unanimously prefer not to develop the philosophical issues raised by these corollaries and instead hasten to solve the question by introducing two conclusions about efficient causes. For Oresme and Albert, when such causes have an influence on the effect, the answer to the question is negative (that

24. Oresme, p. 73. The second conclusion is followed by a series of *probationes*, which deserve to be entirely quoted : "Patet primo quia, cum forma non sit aliud quam formatio materie, impossibile est quod formatio istius materie eadem numero fuerit formatio alterius materie. Secundo, sicut si una cera habuit unam figuram, impossibile fuit eandem figuram numero esse alterius cere, ita est de materia et de forma, quia dicit Aristoteles primo *Physicorum* quod hoc est simile. Tertio, si *a* forma potuit educi de materiis *b* et *c*, ponatur igitur quod educatur de *b*; tunc, cum in materia *c* nulla sit facta mutatio, sequitur quod adhuc potest de *c* educi quidquid poterat ante. Educatur igitur forma *a*, et tunc sequitur quod eadem forma *a* erit in pluribus locis et in pluribus materiis, quod est impossibile," pp. 73-74. For Albert fol. 136$^{va}$, for Marsilius, who depends heavily on Oresme, fol. 73$^{va}$.

25. Oresme, pp. 73-74. A very similar corollary follows the second conclusion concerning efficient causes: "ex hoc patet correlarie quod impossibile fuit Sortem generari ab alio quam a patre suo," p. 75. Albert uses two different corollaries to state the same thing: in the first he ascertains the impossibility for Socrates to be born from an embryo other than the one from which he was actually born, which implies (cor. 2) that he could not have had different parents than his own, fol. 136$^{va}$. Marsilius also has two corollaries; one of them is very interesting, because it hints at a topic that will be dealt with in the following question: "tertium corelarium: si asinus pro instanti tunc non fuisset conceptus quo concipiebatur, aut genitus pro quo generabatur, ipsum impossibile fuisset umquam fuisse. Patet ex precedenti, quia non potuit alia hora generari"; at the end of this corollary, Marsilius, who had so far taken recourse to a less dangerous example (a donkey) than Oresme and Albert, extends the validity of what is stated in the corollaries to all corruptible beings: "et sicut hec correlaria dicta sunt de asino, ita intelligendum de homine et de equo et de aliis huiusmodi animalibus," fol. 73$^{va}$.

is, the same effect cannot be produced by two different causes).[26] Marsilius records these two conclusions, but he thinks that they are untenable and even contradictory, because an agent must have some influence on the effect;[27] he proposes, therefore, a distinction between *cause per se* and *cause per accidens* grounded on the fact that the former produces an effect which "a sua natura innatum est inclinatione naturali producere";[28] only the *causa per accidens* provides thus no useful tool for individuating the effect.[29]

The influence of the agent (according to Oresme and Albert) and the *causa per se* (according to Marsilius) are an effective remedy against the arguments of the first section, and above all to those that appealed to the external nature of efficient causality. The term "*idem*" of the argument, where it was stated that every agent of the same species can produce the same effect, must be interpreted as referring to a specific and not to a *secundum numerum* identity.[30]

26. An affirmative answer is permissible only when instrumental and occasional causes are involved: "nulla est variatio effectuum propter aliquam causam agentem non influentem in effectum ... Probatur, quia ex quo non influit in effectum, videtur quod effectus nihil intrinsecum habebit ex ipso, ergo etiam non debet habere distinctionem essentialem ex diversitate ipsorum, et ideo non dicuntur proprie cause ... Patet in exemplo de malleo propter cuius variationem non variatur effectus ... et ita etiam de agentibus applicantibus, sicut ille qui ponit ignem in lignis," p. 74. Provided that the agent's influence is responsible for every change in the effect, and every agent is marked by a (numerically) different influence, effects can be distinguished on the basis of the agents. In the third *probatio* of the second conclusion, Oresme stresses the importance of the role played, in addition to matter, by the efficient cause in diversifying effects: "tertio, arguitur auctoritate Commentatoris quinto *Metaphysice* commento duodecimo, ubi dicit quod diversitas effectuum est propter diversitatem materie et motoris, id est agentis; modo si divisim sola diversitas materie faceret diversitatem effectus, frustra ibi poneretur diversitas motoris sicut frustra ibi adderetur diversitas finis vel diversitas cause applicantis vel cause instrumentalis," pp. 74-75. For Albert fol. 136$^{vb}$.

27. "Nec probatio quam adducunt in propositionibus suis sive suarum conclusionum videtur valere. Dicunt enim: cum agens non influit effectus productus non capit de agente aliquid intrinsecum, nam hoc est manifeste falsum, cum omnis effectus ab agente suo, sive influat sive non, capiat totam suam essentiam," fol. 73$^{vb}$.

28. "Dicitur autem de per se agere quod a sua natura innatum est inclinatione naturali talem effectum producere," fol. 73$^{vb}$. In the *notabilia* preceding the *conclusiones*, Marsilius fixes the differences between merely instrumental causes, which do not operate in the effects, and instrumental ones only in comparison with the first cause (as all natural causes), to be considered as primary causes with regard to the former. On *aptitudo naturalis* see Merle, "Aptum natum esse."

29. The *probatio* of the second conclusion, concerning the *causa per se*, relies upon the impossibility of a being to be produced twice, a topic discussed profusely in the second book of *De generatione et corruptione* by Buridan and Marsilius.

30. "Dico quod idem ignis potest esse simul a duobus ignibus; et si fuisset unus solus ignis comburens lignum, dico quod causat alium ignem in numero quam isti duo fecerunt. Et si dicas quod non, quia videtur quod esset omnino idem, negatur, quia licet esset consimile non tamen esset idem," p. 75; for Albert fol. 136$^{vb}$, for Marsilius fol. 74$^{ra}$. As far as substance is concerned (the corpse and the chick), Oresme makes further distinctions; he also deals with the possibility of an egg being brooded by different hens in the replies to the *pro*-arguments, even though that example was not mentioned in them: "cum dicitur quod idem cadaver sit etc., dico quod Sortes percutiens bovem non proprie est agens formam cadaveris nec influit aliquid, sed est solummodo agens extrinsecum applicatum, sicut ille non est causa agens proprie qui

The confusion between specific and numerical identity vitiates also the above-mentioned argument from the effect: Oresme and his younger colleagues do not dispute the possibility that some effects can be produced by causes belonging to different species. They firmly assert, however, that it is impossible that a single effect can be brought about by two different causes with similar powers, because this likeness is a specific feature that does not prevent a numerical distinction and consequently different influences.[31]

The argument *ex simili*, which is built on the observation that different agents can corrupt the same substance, is refuted on the basis of the peculiarities dividing proper causality in generation and corruption, respectively.[32]

The corollaries quoted above notwithstanding, the only hints at determinism occur in one of Oresme's *pro*-arguments in the opening section of the *questio* and in the final reply, where the main objection rests upon the absurdity of an infinite regress.

## The *questio* "Utrum dato aliquo generabili illud in quolibet plurium instantium possit generari"

The first explicit mention of a related notion — contingency — is to be found in the *questio* devoted to ascertaining whether a certain given corruptible substance could have been generated at different instants. In this *questio* Oresme, followed by Albert and Marsilius, takes recourse to the motion of celestial bodies. This is a dangerous move because of the implicit support it lends to astral divination, a notion Oresme often sharply criticises. This move should, however, be understood as the product of a search for a fixed system of reference designed to make the analysis of sublunary changes easier, rather than as an assertion in favour of astrology. If one recalls Oresme's hypothesis of the incommensurability of celestial motions, one will find it easy to understand how strong a criterion for

applicat ignem lignis; sed proprie causa cadaveris est forte calor naturalis mediante calore extrinseco ... Si diceretur quod idem quod producitur ex illo ovo a gallina ista calefaciente produceretur ab una alia, responditur quod si forma substantialis ipsius galline aliquid influat in effectum, tunc negatur; si nihil, sed solummodo ille calor sit causa instrumentalis, et non sit ibi aliquod agens principale huius effectus preter corpus celeste, tunc conceditur, quia ille galline non sunt nisi agentia instrumentalia et applicativa respectu talium effectuum," pp. 75-76.

31. "Negatur consequentia qua infertur: a quolibet diversorum agentium specie potest produci idem effectus numero. Et ad probationem dicitur quod maior ratio est, quia ad producendum eundem effectum in specie sufficit quod cause sint consimilis virtutis. Modo cause diversarum specierum bene sunt consimilis virtutis et ideo idem in specie possunt producere, sed ad producendum eundem effectum numero requiritur quod cause sint eiusdem virtutis numero; modo nulle cause totales naturaliter diverse sunt eiusdem virtutis numero et ideo eundem effectum nequeunt producere," fol. 74$^{rb}$ (Marsilius). For Oresme pp. 75-77; for Albert fol. 136$^{vb}$. An actual influence on the effects is generically denied to final causes; and where they do possess such an influence, what has been established for efficient causes can also be extended to them; for Oresme, p. 75; for Albert fol. 136$^{vb}$; for Marsilius fol. 74$^{rb}$.

32. Oresme points out that the *corrumpens* "non influit aliquid ad essentiam corrupti," p. 77; for Albert fol. 136$^{vb}$; for Marsilius fol. 74$^{ra}$; see also the preceding note.

the location of natural beings in the temporal *continuum* the uniqueness of astral configurations provides.[33]

The first of the *pro*-arguments, that is for the possibility of generation at different instants,[34] relies on a particular definition of the term "*contingens*":

> et arguitur quod sic, posito quod *a* sit contingenter generabile et hoc est possibile ut patet primo *Celi*, ubi dicitur quod non oportet quod omne generabile de necessitate generetur. Tunc arguitur: *a* est contingenter generabile, ergo potest indifferenter generari cras et post cras, posito quod nondum sit aliqua dispositio propinqua ad generationem ipsius *a*.[35]

This is a very important factor in Oresme's (and later in Albert's and Marsilius') search for an individuating principle in time: if contingency can be defined only on the basis of the possibility that a being can exist in different instants of the temporal *continuum*, it seems that Oresme is wedged in between the Scylla of giving up his efforts of establishing a fixed causal order for natural events, and the Charybdis of surreptitiously introducing a deterministic notion of them. We shall see how he is going to master this difficulty by relying on a different notion of contingency, inspired probably by Scotus' modal logic.

Of the two arguments[36] against those who do not share his position about contingency, only the second indirectly encourages a deterministic view of natural events: to deny that an identical being can be produced at different times is tantamount to maintaining that generation cannot be delayed, so that if a being is not produced at its "natural" instant, it will never exist.[37]

The other *pro*-arguments have a more modest philosophical interest: two of them refer to the relationship between generation and corruption;[38] the last of them charges the supporters of the opposite position with contradicting themselves by admitting an actual infinite.[39]

33. The uniqueness of natural events is in any case granted without resorting to the hypothesis of incommensurability by the unceasing change in matter, in agents and by the *secundum numerum* diversity of celestial motions. See Maier, *Metaphysische Hintergründe*, pp. 47-137.
34. Oresme announces that he is making an extended use of the term "instant": "sciendum est primo quod non est vis si instans sit in mensura divisibili vel non, quia capio hic 'instans' pro initio essendi alicuius rei," p. 80; for Marsilius fol. $74^{vb}$.
35. Oresme, p. 78; the last words limit somewhat the possibility that a natural being is produced in different instants. The same *proviso* is to be found in Marsilius, fol. $74^{rb}$, but not in Albert, fol. $136^{vb}$.
36. In the first argument it is argued that it is impossible from a semantic point of view that a sentence can turn from possible to impossible without changes in the external world: "sit *a* generabile in *b* instanti et non generetur in *b*, sicut est possibile, quia ... est generabile contingenter; tunc *a* aut postea potest generari et habetur propositum, scilicet quod potest generari plus quam in uno instanti; aut non potest, et tunc sequitur quod illa propositio: *a* est generabile, que prius fuit possibilis, facta est impossibilis, et tamen nulla mutatio ex parte rei facta est," Oresme arg. 6, p. 79; Albert arg. 6, fol. $137^{ra}$; Marsilius arg. 7, fol. $74^{va}$.
37. "Nisi questio esset vera, sequitur quod nulla generatio posset differri, quod videtur inconveniens. Et consequentia nota est, ex quo generabile non potest ita generari in uno instanti sicut in alio," Oresme arg. 5, p. 79; Albert arg. 5, fol. $137^{ra}$; Marsilius arg. 3, fol. $74^{rb}$.
38. Namely on the basis that a natural being can be corrupted in different times, Oresme arg. 3 and 4, pp. 78-79; Albert arg. 3 and 4 fols. $136^{vb}$-$137^{ra}$; Marsilius arg. 2 and 5, fols. $74^{rb-va}$.
39. Oresme, p. 78; Albert arg. 2 and 7, fols. $136^{vb}$-$137^{ra}$; Marsilius arg. 5 and 8, fol. $74^{va}$.

In the *in oppositum* argument Oresme, Albert and Marsilius state that an affirmative answer to this question implies the admission that a corrupted thing can *reverti idem numero*. John Buridan and later Marsilius of Inghen deal with the same problem in a question on the second book of *De generatione et corruptione*; the lack of a special *questio* on this topic in Oresme's and Albert's commentaries leads one to suppose that they considered the problem already solved in their commentaries on the first book.

In the three commentaries the discussion is articulated in two parts, the former devoted to the analysis of certain features of physical change — that is of continuous and instantaneous motion (*motus* and *mutatio*) — and the latter to the solution of the question. Marsilius relies heavily on Oresme's commentary, opening both parts with a series of *suppositiones*; Albert omits those preceding the second part.

In the first of these *suppositiones*, Oresme maintains that elapsed time cannot naturally come back ("tempus preteritum non potest redire"). Like Albert and Marsilius after him, he points out that according to some, such a return is impossible not only under natural circumstances (*secundum potentiam naturalem*), but also under supernatural circumstances (*supernaturaliter*), since it always implies a contradiction.[40] None of them, however, takes here a clear position regarding these two different solutions, even though Oresme courageously responds to the theological argument according to which reincarnation after the Last Judgement can be viewed as a case of the return of a formerly corrupted being.[41] Oresme chooses not to venture on theological turf and limits himself to a generic admission of God's absolute power to summon the past *supernaturaliter loquendo*, and he states clearly that his discussion is limited to the natural course of events (*naturaliter loquendo*).[42] As for the latter, its possibility is firmly rejected in two conclusions of the *questio*.

The relationship between motion, time and moved things (in a general Aristotelian sense) is examined in the two remaining *suppositiones*. Oresme explains the relation between motion and time through the temporal connotation inher-

40. Oresme puts forth an argument supporting the impossibility of a return of elapsed time also at the supernatural level: "sit prima suppositio quod tempus preteritum non potest redire naturaliter, nec etiam secundum aliquos supernaturaliter, quia implicat contradictionem, et sequitur quod idem tempus esset bis in eodem et duabus vicibus et ante et post, et, cum iste sint differentie temporis, idem tempus esset in diversis temporis temporibus; et sic temporis esset tempus; et sic esset processus in infinitum, quod implicat contradictionem," p. 80; for Albert fol. 137$^{ra}$; for Marsilius fol. 74$^{va}$.

41. "Ad secundum, dicunt aliqui quod Deus non potest regenerare idem numero et quod implicat contradictionem, sicut quod reiteraret tempus preteritum. Et quando erit resurrectio, non erit propter hoc nova productio aut nova creatio, sed separatorum, scilicet anime et corporis, reunio. Tamen possibile est supernaturaliter, et ideo questio debet intelligi naturaliter loquendo," p. 84.

42. The two arguments favouring a different solution are, however, very important, because the restriction of God's power is apt to protect the individuating criterion from the interference of the divine will at least in the case of the past.

ent in every motion ("motus significat tempus vel saltem connotat vel importat tempus et prius et posterius").[43] He attributes no special ontological status to motion; the denotation of the term "*motus*" is in fact the thing moved ("motus non est aliud quam mobile, vel saltem connotat aliud").[44] Once he has stated precisely the meaning of the terms he uses, Oresme — and Albert and Marsilius after him — presents two conclusions regarding the use of motion as a basis for the numerical distinction of natural beings.

The strategy selected by these three masters is undoubtedly sound: the special ontology of natural beings, grounded in the Aristotelian theory of the composition of substances by form and matter and characterized therefore by a mixture of act and potency, allows one to see in motion (through which occurs the passage from potency to act) a principle that individuates natural beings. Since, moreover, "*motus*" denotes the thing moved and not some problematical *fluxus forme*, to fix a rule for identifying movable substances is tantamount to fixing a rule that is valid for every natural being. According to this position, the individuating principle is therefore to be sought in form and matter, which are not considered separately and as static elements, but as continuous, natural processes from which the different Aristotelian kinds of motion arise.

The first conclusion ("quod omnem motum factum in aliquo tempore impossibile est fieri in alio tempore idem numero")[45] relies not only on the preceding *suppositiones*, but also on the results concerning causality obtained in the previous *questio*. One of them appeals in particular to the temporal connotation of the term "*motus*"; when it is used with a qualification as, for instance, in the expression "*a* motus," this qualification involves a precise reference to time. "*A* motus" can thus be reformulated in a clearer sentence as "hoc moveri in *b* instanti," in which the thing moved is, according to the first *suppositio*, immediately specified *secundum numerum*. In the other argument, Oresme takes recourse to the causal chain, affirming that, given the causal subordination of sublunary changes to celestial motions,[46] every elementary substance is indi-

43. Oresme, p. 80; for Albert fol. 137$^{ra}$; for Marsilius fol. 74$^{va}$.

44. "Et ideo utendum est 'motu' secundum illam connotationem sicut facit Aristoteles, qui dicit quod revolutio hesterna non est revolutio hodierna, et ita est de tempore," p. 80. See also Caroti, "La position."

45. Oresme, p. 80; for Albert fol. 137$^{ra}$; for Marsilius fol. 74$^{va-b}$.

46. "Secundo, impossibile est motum celi qui est uno tempore esse in alio tempore, ergo ita est de quocumque alio motu. Antecedens est clarum et potest probari per suppositionem primam; consequentia probatur per Aristotelem in octavo *Physicorum*, quia omnis alter motus dependet ex motu celi ordine essentiali. Cum ergo per precedentem questionem variatio cause principalis facit variationem effectuum, sequitur quod alius est motus qui dependet ex motu celi hodierno et alius qui dependebit ex motu celi crastino; ergo motus Sortis qui est hodie non posset dependi nec causari a revolutione crastina," Oresme, p. 81; for Albert fol. 137$^{ra}$; for Marsilius fol. 74$^{vb}$. No reference is made here to astral influence; the argument relies in fact on the dependence of motions below the moon on celestial motions. The first conclusion is followed by a corollary: "ex hoc sequitur corelarie quod si Sortes moveatur nunc aliquo motu quod, si differret, moveretur alio motu. Et patet etiam quia propter hoc semper est alia et alia pars

viduated in a given causal series by a single celestial motion. This conclusion, together with that of the second part of the *questio*, can be viewed also as an indirect but firm reply to the question of whether God can regenerate a corrupted thing in numerical identity, or regenerate elapsed time. Oresme had previously argued that such an assumption involved a contradiction and was therefore impossible in all cases, not only at the natural level.[47]

In the second conclusion, the analysis is broadened to the more general meaning of "*motus*" so as to include all natural change ("secunda conclusio: quod illud quod acquiritur per unam mutationem vel actionem, impossibile fuit acquiri per aliquam aliam distinctam").[48] Local motion, too, determines the numerical identity of natural substances; nevertheless, the reference to place — which remains unchanged[49] — in addition to time can in this case be misleading.

The second part of the question is in all three commentaries dominated by questions relating to celestial motion, so that an equal emphasis is reserved to time and causality. The role attributed to celestial agency in generation and corruption by the first *suppositio*[50] is specified in the second *suppositio*: efficient causality is to be found in the motion and in the reciprocal positions of the planets.[51] Oresme explains the reason behind this attribution in the third *suppositio*, where he refers to the criterion for individuating natural beings in a causal series (the *causa influens* for Oresme and Albert and the *causa per se* for Marsilius) stated in the previous question.[52] Oresme asserts in the last *suppositio* that it is impossible that the same astral configuration can take place twice, arguing

motus que preteriit et alia que futura est, sicut etiam potest dici de tempore; sic etiam tempus non potest differri nec removeri," Oresme, p. 81.

47. See n. 40 and 41.

48. "Probatur, quia mutatio acquisitiva habet distinctionem numeralem et etiam specificam a termino ad quem, et similiter motus, ergo quandocumque fuisset alia mutatio numero, fuisset alter terminus et aliud productum, ergo istud productum non potuit alia acquisitione produci quam ista qua est productum," Oresme, p. 81; for Albert fol. $137^{ra-b}$; for Marsilius fol. $74^{vb}$.

49. This problem is dealt with in an objection at the end of the first *articulus*: "si obiciatur contra de motu locali, quia unus idem locus numero potest acquiri ab uno motu locali et etiam ab alio potuit acquiri, ergo pari ratione una eadem forma potest acquiri una mutatione et etiam alia; responditur quod non est simile, quia locus non acquiritur nec producitur in esse per motum localem, sed preexistebat ante, sed forma acquiritur et producitur in esse, et ideo est quod diversa corpora possunt sibi invicem succedere in eodem loco ut patet quarto *Physicorum*, non tamen possunt succedere sub eadem forma, quia informatio corporis est generatio forme," Oresme, pp. 81-82; for Albert fol. $137^{rb}$; for Marsilius fol. $74^{vb}$.

50. "Prima est quod omnia generabilia dum generantur dependent a celo tamquam a causa principali et influente," Oresme, p. 82; for Marsilius fol. $74^{vb}$.

51. "Secunda suppositio: quod generabilia dependent a celo etc. non absolute, sed a corporibus celestibus sic se habentibus et sic respicentibus ista inferiora per suum motum," Oresme, p. 82; for Marsilius fol. $74^{vb}$.

52. "Tertia suppositio est quod ex variatione cause influentis variatur effectus, ut patet in alia questione, non solum simpliciter, sed etiam ex variatione in modo causandi et modo sic se habendi et in aspectu et in motu. Patet, quia secundum hoc sunt alie et alie influentie, modo ex alia et alia influentia causatur alius et alius effectus," Oresme, p. 82; for Marsilius fol. $74^{vb}$.

exclusively from the numerical distinction of the related motions and without reference to the hypothesis of incommensurability.[53]

The sole conclusion of this second part is devoted to denying the possibility that a natural being can be produced at an instant different from the one in which it has actually been produced. The arguments invoked here rely upon previous *suppositiones* and *conclusiones* (even of the first part): the first argument invokes the uniqueness of the motions as defined in the first part;[54] the second refers to the dispositions of influent causes, celestial aspects included;[55] the third relies on the continuous change of astral motions.[56]

Instead of supporting his position further, Oresme uses the remaining conclusions to ascertain what is implied by its acceptance and its denial. In the former case, if generation from the same causes is delayed, an effect of the same species can be obtained, but not a numerically identical one.[57] In the latter, one is forced to grant that the same being could be produced twice, a position previously refuted in the *in oppositum* argument[58] and rejected again in the last conclusion.[59]

The final outcome of this discussion of the temporal criteria for individuating natural beings seems to be the admission of a rigid determinism. This impression is corroborated by two corollaries which follow the first conclusion of the second part of this question:

53. "Quarta et ultima est quod impossibile est celum se eodem modo habere, vel moveri eodem motu in numero quo prius movebatur, et eodem aspectu et forma simili; et etiam quod idem aspectus numero potest redire sicut eadem eclipsis numero. Patet, quia tales aspectus fiunt per motum et motus semper est alius, ut probatum est prius," Oresme, pp. 82-83; for Marsilius fol. $74^{vb}$.
54. "Probatur: sit *a* aliquod producibile in *b* instanti sicut prius, tunc producatur productione que sit *c*. Et arguitur sic: impossibile est *c* productionem alias ante fuisse, ergo impossibile fuit *a* produci ante; antecedens patet ex prima conclusione; consequentia tenet ex secunda, quia *a* non potest produci alia productione quam *c* productione," Oresme, p. 83; for Marsilius fol. $74^{vb}$.
55. "Secundo in instanti *b* cause sunt disposite pro *a* producendo, sed impossibile est quod alias fuissent in eadem proportione et numero, et quod fuisset idem aspectus celi," Oresme, p. 83; for Marsilius fol. $74^{vb}$.
56. "Tertio confirmatur: in quolibet instanti vel hora motus celi est alius quam ante, ergo generatio necessario erit alia," Oresme, p. 83; for Marsilius fols. $74^{vb}$-$75^{ra}$.
57. "Quarto, si modo cause sunt disposite pro *a* producendo et impediantur ne producant, tunc impossibile est quod alias sint in eadem dispositione, licet bene in simili, ergo impossibile est quod producant alias *a*, licet bene producant *b* simile," Oresme, p. 83; for Marsilius fol. $75^{ra}$.
58. "Quinto, si *a* producatur nunc et potuit ante produci, ergo non nisi ex istis causis sic se habentibus sicut nunc, et si alias se habuerunt sic sequitur quod produceretur *a* pari ratione, quia alique sunt que non possunt impediri naturaliter sicut celum," Oresme, p. 83; for Marsilius fol. $75^{ra}$.
59. "Ultima conclusio: quod impossibile est idem numero posse regenerari," Oresme, p. 84; for Marsilius fol. $75^{ra}$.

> ex hoc infero correlarie quod si Sortes potest generari in *b* instanti, et non generatur, tunc postea impossibile est Sortem generari. Secundo, omne generabile necessario generabitur nisi per liberum arbitrium impediatur, quod tamen liberum arbitrium potest generationem auferre et non diferre.[60]

The philosophical pregnancy of such assertions notwithstanding, neither Oresme nor Albert or Marsilius manifest the faintest worry about their implications for natural determinism. This seemingly odd attitude can be partly justified on the grounds that the discussion deals exclusively with natural beings: these are open to human interference, as they expressly admit. This interference is nevertheless rather limited and cannot claim an active role inside the natural processes. That is to say, it can prevent some events from taking place, but it cannot in any manner alter the laws of the causal order. To maintain a precise order in natural causes (whose potency is not like that of free ones, *ad opposita*) does not, moreover, require a rigid natural determinism approaching divine omnipotence. As we shall see in the next paragraph, natural necessity cannot compete with divine necessity, because even its total infringement implies a contradiction only in natural things, and not an absolute contradiction, which would alone limit God's power.

In the answer to the first *pro*-arguments Oresme proposes a different definition of the term "*contingens*," probably relying upon Duns Scotus' notion of *possibilitas logica*:

> ad primam, concedo quod aliquid est contingenter generabile non ex eo quod indifferenter possit generari in hoc instanti vel in illo, sed quia potest generari in uno instanti et per liberum arbitrium potest impediri quod numquam generabitur.[61]

Oresme's probable source is a passage from the well-known d. 39 of Scotus' *Lectura* on the first book of the *Sentences*,[62] where Scotus refers to the human will, which is a free agent, while Oresme is taking account of generation, which is only a partially free event (that is, only insofar as human determination is concerned). I think, however, that the weak form of necessity in natural events (whose opposite is an *impossibile* only according to the natural plan, but not one that involves a contradiction) is also applicable to singular natural events, which can be impeded not only by God, but also — at least in the sublunary sphere — by human free will.

**60.** Oresme, p. 84.

**61.** Oresme, p. 85; for Albert fol. 137$^{rb}$; for Marsilius fol. 75$^{ra}$.

**62.** "Et huic possibilitati logicae correspondet potentia realis, nam omnis causa praeintelligitur suo effectui — et ita voluntas in illo instanti in quo elicit actum volendi, praecedit natura volitionem suam et libere se habet ad eam; unde in illo instanti in quo elicit volitionem, contingenter se habet ad volendum et contingentem habet habitudinem ad nolendum: non quia prius habuit habitudinem contingentem ad volendum, quia tunc non fuit causa, sed nunc — quando est causa eliciens actum volendi — contingentem habet habitudinem ad actum, ita quod 'volens in *a*, potest nolle in *a*'", Johannes Duns Scotus, *Opera Omnia*, p. 495. *Lectura*, I, d. 39, q. 5, 51, 15-23. Simo Knuuttila has stressed the importance of Scotus' contribution to the history of modal notions; see "Duns Scotus' Criticism," "Nomic Necessities,"*Modalities*, pp. 139-149.

Generation of a particular being can thus be totally annihilated, but never delayed;[63] and the sentence "*a* est generabile," which is possible until the moment in which the particular thing denoted by *a* is in fact generated, can become impossible if an act of will hinders its generation.[64] The precise location of a natural substance within its causal series and inside the temporal *continuum* is a handy tool not only for putting a certain order into real beings, that is to say, those whose potency has already been actualized, but also in possible beings, that is to say those whose potency is not yet actualized — or could in fact never be actualized — and yet belong to a definite causal chain. Every natural potency is in fact causally and temporally determined in such a way that, if at that very instant for which the passage from potency to act has been foreseen, this event does not occur, it is improper to speak of a certain given (and numerically distinct) potency, because from that moment onwards that (numerically distinct) potency belongs either to the set of necessary beings (if it has been actualized) or to the empty universe of impossibilities (in case it has not passed from potency to act).

The battery of arguments which introduces a question does not always contain references to specific philosophical positions; they are in fact very often *ad hoc* arguments, introduced to make clear the meaning of the terms or the context of discussion. Yet, I think that Oresme's discussion can be put into its historical perspective. In one of the two versions of his commentary on *De generatione* — the one named A by Bernd Michael — Buridan deals explicitly with necessity and contingency in a *questio* we find also in Oresme's, Albert's and Marsilius' commentaries.[65] Buridan, partially followed by Albert of Saxony, relies in his analysis of the meaning of "*necessarium*" on the different temporal restrictions of propositions containing modal operators. Excluding the past, that

63. "Ad quintam concedo quod nulla generatio potest differri, potest tamen auferri," Oresme, p. 85; for Albert fol. 136$^{vb}$; for Marsilius fol. 75$^{ra}$.

64. "Ad sextam, concedo quod ista propositio '*a* est generabile' est possibilis, et si per liberum arbitrium impediatur, tunc postea est impossibilis," Oresme, p. 85; for Marsilius fol. 75$^{rb}$. The semantic problem raised in the opening arguments is not well phrased, because the denotation of *a* in "*a* est generabile" does not range over a determined thing for the special power of *generabile* to "amplify" the supposition of *a*; in his reply to that argument Oresme resorts either to the changes in the causal order or to the possible interference of free will rather than to the special supposition of *a*: "ad septimam, cum dicitur quod nichil est mutatum in *a*, dico quod, licet nihil sit mutatum in *a*, tamen mutatio facta est in causis que debeant producere *a*, scilicet in celo, quod movetur continue, et etiam in hoc quod alique impediuntur per liberum arbitrium; et nisi hoc fuisset, *a* necessario fuisset productum. Et ideo possibile est quod aliquid sit possibile et postea impossibile sine mutatione, scilicet rei signate per subiectum illius," Oresme, p. 85.

65. In the seventh *questio* on the first book ("consequenter queritur utrum illa consequentia Aristotelis contra Empedoclem sit bona: si impossibile esset elementa generari substantialiter impossibile esset ea alterari," MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 3097, fols. 109$^{vb}$-110$^{vb}$). For version B see n. 7.

is dealing exclusively with propositions in the present and future tense, *possibile* refers to things that can be produced at different instants:

> secundo modo, "possibile," "necessarium" et "impossibile" restringitur ad tempus presens et futurum solummodo, scilicet tempore preterito circumscripto ... isto modo possibile dicitur quod potest nunc esse vel poterit esse in futuro simul disiunctive.[66]

This definition of "*possibile*" calls to mind that of "*contingens*" in the *pro*-argument of Oresme's discussion, against which this author proposes a notion of contingency that is temporally determined in a rigid manner.

## The different meanings of "*necessarium*" in the *questio* "Utrum si generatio esset impossibilis alteratio esset impossibilis"

Without leaving Oresme's commentary on *De generatione et corruptione*, we can try to proceed further into the details of his notion of natural necessity in relationship either to divine omnipotence or to contingency. This can be easily achieved by considering the six different meanings of the term "*necessarium*" listed by Oresme in the third *questio*[67] on the first book. Marsilius follows without any significant change Oresme's outline in his fourth *questio*,[68] while Albert gives his preference to Buridan's decision to investigate the meaning of the term on the basis of the sentence's *restrictio temporalis*.[69]

The relative character of natural necessity can be grasped from the first distinction of the two meanings of "*impossibile*" in the opening remarks of the discussion:

> impossibile in proposito est duplex: quoddam quod implicat contradictionem, aliud quod non, tamen est impossibile secundum cursum nature sicut terram esse prope orbem lune.[70]

What cannot happen according to natural order (*impossibile secundum cursum nature*) does not necessarily imply a contradiction; for the earth to approach the moon, for instance, is unimaginable for the natural philosopher, but it is not outside God's power, whose boundaries coincide with the law of non-contradiction.[71] This notion of the *impossibile* enables Oresme to extend to natural causes (not determined *ad opposita* like free will) a sort of contingency similar to that of the human will, without, however, denying to them the essential feature of natural potency, that is, the natural inclination towards a determined

66. Fol. $110^{ra\text{-}rb}$. On this topic see R. van der Lecq's introductory notes to her critical edition of Johannes Buridanus, *Questiones longe super librum Perihermeneias*, pp. XXVIII-XLV.
67. "Queritur tertio si generatio esset impossibilis alteratio esset impossibilis," Oresme, p. 17.
68. Fol. $68^{va}$.
69. Fol. $133^{vb}$. Albert relies on Buridan, specifically on the text of version B; in version A, a third distinction is proposed which considers the temporal "restriction" to the present tense; in this context Buridan quotes the famous passage from *De interpretatione*, ch. 9. In the redaction preserved in MS Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. lat. 2185, no such destinction is being invoked.
70. Oresme, p. 21.
71. See Knuuttila's articles quoted in n. 62. On this topic see also the important article by Hugonnard-Roche, "Modalités."

effect. The exact location of natural beings in the causal and the temporal chain can — without any risk of encouraging a rigid determinism — be interpreted, I believe, as an original effort aiming at salvation of the causal order from the dangers of an improper and immoderate use of *potentia Dei absoluta*, which could menace, as we have seen, even past events.

In the first *notabile* of the first part, Oresme states that "necessary" and "impossible" are opposed to each other in a contradictory fashion;[72] we can thus be entitled to think that "necessary," too, has two different meanings: an absolute in opposition to the strong "impossible" (that is to say an "impossible" whose denial implies a contradiction follows) and a weak "*necessarium*" which constitues the contrary of the weak "impossibile" of the natural orders. Oresme proposes a sixfold division of the meaning of "*necessarium*," but four of them (or at least three, if one excludes the necessity of past events) are merely subdivisions inside the second, weaker type of "*necessarium*."

Departing from Buridan's more logical scheme,[73] Oresme bases his analysis directly upon the temporal qualifications of things denoted by the *complexe significabile*,[74] and refuses expressly to resort to temporal qualifications of a proposition's truth or meaning.[75] "Necessary" in the strong sense is what is without temporal qualifications, because "not to be" is contrary to its essence (*non potens non esse, non cessans esse*); the lower level of necessity is that involving future contingents and natural events. This dualistic ontology relies upon the metaphysical distinction between act and potency: the only truly necessary being God, is always in act, destitute of potency, hence unchangeable and therefore not to be located within a causal-temporal chain of causes. All other beings posses potency as an essential component, which is at the same time a mark of imperfection and the only means of reaching a partial perfection (inside the species). This perfection can be reached exclusively through a sequence of

72. Oresme, p. 18.
73. Buridan, however, states explicitly, like Oresme and Marsilius, that his logical analysis relies on an ontological one: "secundo notandum est quod si ista aliquando dicuntur de complexo sicut de oratione, hoc est equivoce, unde orationes non dicuntur impossibiles nec necessarie nisi sicut urina dicitur sana vel egra, quia est signum sanitatis vel egritudinis," fol. 133$^{vb}$. For Oresme: "propositio non dicitur necessaria nisi equivoce, quia est signum significabilis necessarie sicut urina dicitur sana, quia est signum sanitatis. Probatur statim, quia Deum esse est necessarium posito quod nulla propositio esset, et erat necessarium antequam mundus esset," Oresme, p. 19.
74. "Tunc est distinctio quod 'necessarium' quandoque dicitur de significabili incomplexe, sicut dicimus quod Deus est necessarius, et similiter 'impossibile,' sicut dicimus quod chimera est impossibilis. Alio modo 'necessarium' dicitur de significabili complexe, sicut dicimus quod Deum esse est necessarium vel hominem esse animal, et similiter 'impossibile,' sicut hominem esse asinum ... Pro secunda distinctione sciendum est quod necessarium in proposito accipitur pro significabili complexe, et similiter 'impossibile'; et ideo intentio questionis est: si generationem esse esset impossibile alterationem esse esset impossibile," Oresme, p. 19.
75. "Nec valet ista descriptio, quod 'necessarium' est quod semper verum est vel quod semper est ita sicut ipsum significat, quia solem eclipsari non esset necessarium vel etiam generationem esse," Oresme, p. 19.

passages leading from potency to act, either regulated by a fixed causal series, or without any external constraint in cases where free agents are involved. Oresme's effort to establish a criterion for the individuation of natural beings through a specific causal order through reference to definite temporal data can be fully understood in the light of this ontology, where a clear-cut distinction is drawn between the atemporality of God's perfection and the continuous change of natural bodies, which are ruled by laws whose necessity implies a temporal dimension. Natural bodies are either exposed to the danger of limited incursions from beings provided with intellect and will, or — what is more important — totally at the mercy of God's absolute power. This absolute power is, however, in some way limited; even though Oresme does not expressly discuss the problem of whether God can undo the past, I am inclined to suppose that he is convinced that God could, before creation, establish different sets of natural laws, but afterwards can no longer interfere either with the past or with natural laws as established.[76]

The description of "necessary" preceding the discussion ("necessarium potest sic describi: necessarium est quod non potest eternaliter vel semper non esse donec fuerit; ita contingens est quod potest eternaliter non esse posito quod numquam sit, ita etiam potest esse")[77] does not exhaust all possible meanings, as the temporal clause "donec fuerit" is absolutely unsuitable to describing the atemporal nature of divine necessity; this description is, moreover, subsequently quoted in connection with what seems to be the weakest meaning of the term concerning future contingents. I think thus that Oresme is speaking here only about the weak form of necessity.

To have a more complete view of the meaning of "necessary" we must look at the sixfold division which Oresme presents of this notion in his commentary. The first basic distinction concerns on two different types of "*necessarium*," a strong type and a weak type: the former, whose opposite is the type of "*impossibile*" implying a contradiction, refers only to God, who cannot not be ("non cessans esse") and therefore has no temporal limits; the latter, whose negation does not involve a contradiction and which can thus become impossible, refers to temporally limited beings:

> primo modo dicitur de eternitate continua ab utraque parte, et sic Deum esse est necessarium; et sic dicitur "necessarium" quasi "non cessans esse." Secundo modo dicitur "necessarium" de continua eternitate tantum ab una parte, ut a parte post, et sic Sortem fuisse dicitur necessarium; aut a parte ante, et sic solem eclypsari crastina die fuit necessarium. Et tale necessarium potest bene transire in impossibile.[78]

76. According to Peter of Ailly, this is the position shared, by Gregor of Rimini and other theologians, see Courtenay, "John of Mirecourt and Gregory of Rimini," p. 162, n. 149.
77. Oresme, p. 19.
78. Oresme, p. 19.

So as to dispel any doubts about the latter type of beings, whose eternity *a parte ante* could be considered as coextensive with God's eternity, Oresme's concluding words state clearly that this kind of necessity can become an impossibility ("potest bene transire in impossibile"). We can grasp easily the sense of this statement: as far as the first class of beings is concerned, free will can prevent the passage from potency to act, with the consequent annulment of that possibility. For the second, which apparently is protected from the interference of the free will, we must remind the reader of the two meanings of "impossible" previously met: violating the "impossible" *secundum cursum nature* does not involve a contradiction, and thus God can, for example, stop the sun and prevent forecasted eclipses. *Inevitabiliter* seems thus to refer only to human free will and does not imply a limitation of God's power.

To be exposed to the risk of impossibility is therefore an essential feature of beings described by the second general (temporally limited) meaning of "necessary"; this peculiarity makes the task of distinguishing this type of necessity from contingency arduous. The first meaning of contingency takes account of God's absolute power, in the face of which everything, whose negation does not imply a contradiction, is completely contingent; the second is limited to the created world, where the notion of *contingens* is rooted in the distinction between two different sorts of potency, predetermined — typical of natural material beings to which this weak form of necessity refers — and free — characteristic of beings provided with intellect and will (whose potency, unlike that of the first class, is *ad opposita*), to which the notion of *contingens* properly refers. Weak necessity, which cannot rival divine necessity, secures nonetheless the foundation of a scientific, demonstrative natural philosophy; its only limitation imposed is the incomplete evidence of demonstrations of natural philosophy.[79]

If the continuous eternity *a parte ante* of the set of things that happen inevitably can give the impression of being able to compete with God's eternity, the ontology of particular items belonging to this category bears not the faintest resemblance to God's eternity. Their appearance on the scene of the world is limited and intermittent like that of supernumeraries.[80]

79. In Oresme's commentary, more precisely in the first *questio* of the first book ("Utrum possit evidenter convinci aliquam generationem esse"), the weaker evidence of physics is compared to the stronger evidence of mathematics: "alia distinctio de evidentia; unde quedam est in principiis notis ex terminis sicut principia mathematicalia et similia, et ita de eis que evidenter sequuntur ex illis sicut sunt conclusiones mathematice. Alia est evidentia in principiis notis per experientiam, sicut quod ignis potest calefacere, et etiam conclusionibus inde sequentibus vel consequentia necessaria vel possibili; et talis evidentia sufficit in scientia naturali," Oresme, p. 4.

80. "Tertio modo dicitur 'necessarium' eternaliter sed intercise, cuius quodlibet singulare inevitabiliter venit, sicut hoc quod est lunam eclypsari ... Quarto modo dicitur sicut prius, scilicet intercise, sed quodlibet singulare evenit contingenter, et ita generationem esse est necessarium, quia non semper continue est generatio, et tamen ante infinitum tempus fuit necessarium generationem esse, et tamen nulla generatio fit necessario," Oresme, pp. 19-20.

Oresme considers, moreover, two other classes of natural beings which share this weak form of necessity: the first includes single events which happen inevitably (that is natural events seemingly outside a precise causal chain), the second contains contingent beings whose potency is already actualized:

> quinto modo est necessarium sicut aliquod singulare quod est solum una hora, et tamen inevitabiliter evenit, sicut est aliqua constellatio. Sexto modo dicitur "necessarium" quod futurum erat contingenter, sed, quia ponitur in esse, ideo tunc, quando est, est necessarium, sicut Sortem esse quando est, necessarium est esse.[81]

The last of these meanings concerning actualized contingents seems to represent the weakest degree of necessity, of the kind that is typical of free agents, whose potency is *ad opposita* and thus not included within a fixed causal chain. In one of the arguments that follow this meaning we find an explicit reference to "necessary" as defined at the beginning of this discussion. This confirms our previous impression that only weak necessity is concerned here:

> et probatur quod ista sit necessaria in sensu diviso, scilicet: Sortes est, quando est, est necessarium. Primo, ex descriptione "necessarii" prius posita, quia iam impossibile est Sortem eternaliter non esse donec fuerit, ergo necesse est Sortem esse ex descriptione posita. Antecedens patet, quia de cetero ista erit necessaria: Sortes fuit.[82]

The future represents the realm of contingency, in an absolute way for human beings, whose will is a potency *ad opposita*, and in a partial way for natural events because of man's or of God's ability to interfere with the causal chain. This kind of contingency seems to concern only particular natural events, and only in such a way that natural laws are not subverted ("generatio potest auferri et non differri"). Some partial infringements notwithstanding, natural laws as such share in fact a strong type of necessity. These same infringements liberate free agents from a rigid determinism; the distinction inside the notion of *impossibile* of two different plans (*secundum cursum nature* and *absolute*) guarantees for God the possibility of interfering with this order. This possibility is, however, only theoretical, and when Oresme resorts to God's *potentia absoluta* to test

81. Oresme, p. 20.

82. Oresme, p. 20. In the two subsequent arguments, Oresme confirms the *post factum* nature of this necessity and distinguishes the different degree of contingency of an actualized potentiality in comparison with one that has not yet been actualized: "secundo sic: capio primum instans esse Sortis, tunc arguitur: Sortem fuisse erit necessarium, igitur Sortes est vel fuit. Antecedens est necessarium, igitur consequens, non pro ista parte: Sortes fuit, igitur pro ista parte: Sortes est. Tertio, quia immediate post hoc erit necessarium Sortem fuisse, igitur nunc est necessarium Sortem esse, et etiam non est ibi tanta contingentia sicut in ista: Sortes erit, quia iam illa de preterito incipit esse necessaria, ut probatum est, igitur ibi maior est necessitas," Oresme, p. 20. In addition to *sensus divisus* and *sensus compositus*, Oresme relies in these arguments on the particular (amplified) *suppositio* of the term "Sortes" in the proposition "Sortem fuisse necessarium est" in order to explain why this necessity does not refer to a time other than the present (that is to "Sortes fuit"). The well-known text of ch. 9 of *De interpretatione*, whose deterministic interpretation (*sensus compositus*) is here refuted, is quoted: "et hoc est quod dicit Aristoteles primo *Perihermenyas*: omne quod est, quando est, necesse est esse; nec potest dici quod intelligat in sensu composito, quia ita erit de ista de futuro contingente," Oresme, p. 20.

the cogency of Aristotle's arguments, he gives finally his assent to Aristotelian natural laws.[83] I think that the main problem — here as in other works such as *De configurationibus qualitatum* or *Quodlibeta* — for Oresme is to save natural causality rather than to shield human free will or God's omnipotence against natural determinism.

What seems the weakest form of necessity, namely the present (or past) coming to be of a contingent being and of a present (or past) natural event, can also be considered to be characterized by a strong sort of necessity. Oresme says explicitly that no true proposition is *contingens* ("ex hoc sequitur quod nulla de presenti, quando est vera, est contingens, licet contingens fuerit quando posita est in esse").[84] Natural events and past and present contingent events cannot, however, rival God's kind of necessity, which, as we have seen, is not grounded in the logical, but rather in the temporal order.[85]

## Conclusions

Without ever abandoning Oresme's commentary on *De generatione et corruptione*, I have tried to analyse in this paper a topic to which this author has always paid special attention: natural causality and the problems it raises with respect to necessity and contingency. I have in the opening section advanced the hypothesis that Oresme's efforts of individuating natural beings with reference to the causal series and time into which they are inserted can be viewed as a clear warning against an immoderate appeal to God's absolute power, which does not, however, challenge His omnipotence. This hypothesis can be supported by Oresme's reference to God's ability to regenerate elapsed time or a corrupted thing, a hypothesis not directly ruled out *supernaturaliter loquendo*, but firmly refuted in the conclusions of the *questio*. In the middle of the fourteenth century, a similar problem (that is whether God can undo the past) was a very important topic discussed mainly in commentaries on the *Sentences*. Oresme was not the first author to deal with it when he commented on *De generatione et corruptione*. Buridan, in fact, alludes to this problem in his last question on the second book, in a context that is very similar to that of the second of the two Oresmian questions previously analysed ("Utrum quod simpliciter corrumpitur possit reverti idem in numero").[86] In this *questio* Buridan deals cursorily with

83. Hugonnard-Roche, "Modalités," pp. 159-160.
84. Oresme, p. 20. For Buridan see R. van der Lecq's remarks in Johannes Buridanus, *Questiones longe super librum Perihermeneias*, pp. XXX-XXXIX.
85. Eternity marks therefore the proper distinction between divine and non-divine necessity, so that Oresme denies to both the philosophical or the theological domain a definition of "*necessarium*" that would resort to a partial eternity: "alii ponunt alium modum necessitatis: quando aliquid incipit esse contingenter quod postea necesse est esse in perpetuum, sicut dicitur de anima Antichristi; sed illud non valet, quia si intelligatur secundum Aristotelem et naturaliter, tunc hoc est falsum et impossibile, ut patet primo *Celi*; si intelligant secundum fidem, adhuc est falsum, quia nullum creatum perpetuatur necessario," Oresme, pp. 20-21.
86. I rely upon version B of Buridan's commentary, found in the already quoted (n. 7) Berlin

the same topic discussed by his younger colleagues in the two *questiones* on the first book: "unde proveniat originaliter ... diversitas numeralis."[87]

The text in which we are interested occurs in a *dubium* following the admission of God's power to resuscitate a corrupted thing.[88] Buridan adopts the distinction, typical of theological discussions,[89] between two different ways of solving this question: either by assuming that God has actually created something (*cum suppositione preteriti*) or by referring to God's power before creation; only according to the latter hypothesis can this kind of conclusion be maintained, though it remains *improbabilis*.

Buridan's inquiry into the individuating principles can be summarized as follows: when agents are the same, the individuating principle is to be attributed to the matter of the patient; when the patients are the same, to the form of the agent; in the more difficult cases where agent and patient are the same (as the sun and the air regarding luminous rays), the numerical distinction is assured by the *interruptio essendi*. In the most difficult case, which concerns different parts of the same body (as in the example of different degrees of heat), Buridan resorts to a less specific intrinsic distinction, without, however, excluding the possibility of an ultimate recourse to God ("nisi ... finaliter possemus recurrere ad primum principium omnium diversitatum et ydemptitatum, quod est ipse Deus").[90]

MS, where it is the 24th and last *questio* on the first book. Michael, *Johannes Buridan*, II, pp. 637-638 for the Berlin MS and pp. 631-634 for version A.

87. Fol. 146$^{vb}$.

88. This conclusion is qualified by Buridan as "*improbabilis*": "aliam conclusionem pono improbabilem, quod nihil prohibet simpliciter corruptum posse reverti idem numero supernaturaliter, scilicet per absolutam Dei potentiam. Quod, sicut prius arguebatur, si omnia nunc essent annihilata preter Deum, totaliter esset ita sicut erat ante mundi creationem et nullo modo aliter, et quecumque Deus tunc intendebat, ista omnia nunc intelliget et omnino simpliciter sicut ea intelligebat. Unde, sicut ponunt fideles, non aliter intelligit Deus preteritum quam futurum; cum igitur Deus agat per intellectum et voluntatem et nec ipse nec alia aliter se habent quam tunc se habebant, nihil videtur prohibere quin omnia possit facere ea que fecit, et non solum similia sed eadem, sic quia omnia sunt in sua potestate sicut tunc, cum non aliter se habebat, ut dictum est, et cum eodem modo intelligit omnia sicut tunc et sua potestas non est nisi intellectus et voluntas," fol. 146$^{va-b}$.

89. See n. 76.

90. "Ad quod respondeo quod sepe ex diversitate materie est diversitas numeralis formarum, si sint ab eodem agente, et aliquando est ex diversitate agentium, si sint in eadem materia. Verbi gratia in eodem medio [et] radii duarum candelarum diversificantur propter diversitatem lucidorum a quibus illi radii sunt; et ita similiter in eadem parte aeris fiunt a diversis partibus solis diversi radii propter diversitatem earum partium solis agentium illos radios. Sed posito quod sit idem subiectum penitus et idem agens penitus, tunc queritur unde proveniat originaliter diversitas numeralis et adhuc materialis. Responditur quod cum sit ydemptitas sensata super colores, effectus dicetur idem numero nisi sit interruptio essendi; sed interruptio essendi prohibet ydemptitatem, unde si in hac aqua non deficiat alietas ex ipsa dicitur eadem. Sed ultra, licet iste lapis dicatur idem numero, tamen una medietas non est idem quod alia, et si aqua continue calefiat tribus gradibus caliditatis, primo acquisitus non est ille idem quod gradus secundo acquisitus, licet totalis caliditas sit eadem numero. Tunc igitur queritur unde est originaliter quod ille gradus est diversus ab isto. Ad hoc potest responderi quod intrinsece se ipsis diversis

Problems related to the fixing of rules for the individuation of natural beings are faced by Buridan in order of increasing complexity, but he is not able to present a solution that can rival Oresme's, to say nothing of his final conclusion which grounds the individuating principle in God's will. Even the simplest step in Buridan's treatment, which considers the formal and material components of substance, reveals shortcomings in comparison with Oresme's. Buridan deals in fact with matter and form separately: when the agents are the same, the individuating principle is attributed to matter, and when matter is identical, to form. Oresme certainly could not have subscribed to this hypothesis, since it is impossible that in formal agents and in matter there can exist an identity according to species but not *secundum numerum*.

Buridan's *interruptio essendi* could be credited with being a possible source of Oresme's criterion for the identification of natural beings through time. In the third solution, in which Buridan attributes to a less specific intrinsic principle the role of individuating different degrees of a quality inside the same material body, he uses *tempus* as a synonym for *interruptio essendi*.

In this passage, however, ("igitur illi gradus non videntur diversi propter subiectum nec diversi propter agens, saltem proprium, nec diversi solum propter tempus, quia credendum est quod *illud idem quod cras potest generari, possit generari citius aut tardius, saltem potest differri aut anticipari per potentiam divinam*") Buridan refuses to attribute to time the power of individuating such degrees and states explicitly that the same thing can be, through God's absolute power, generated at different instants. This reminds us of Buridan's definition of "*possibile*" in his seventh question on the first book of *De generatione*, against which Oresme directs his discussion in his tenth question.

Buridan's text provides only a hint at a more precise historical context for Oresme's solution. But perhaps it also helps to explain Oresme's innovative decision to dedicate two questions on the first book of *De generatione* to the definition of a criterion for individuating natural beings, a decision shared after him also by Albert of Saxony and Marsilius of Inghen.

et nullo alio et omnes res de mundo diverse sunt intrinsece se ipsis diversis et nullo alio. Et sic quecumque erunt diverse, erunt se ipsis diverse et nullo alio, igitur illi gradus non videntur diversis propter subiectum nec diversi propter agens, saltem proprium, nec diversi solum propter tempus, quia credendum est quod illud idem quod cras potest generari possit generari citius aut tardius, saltem potest differri aut anticipari per divinam potentiam. Et sic diceretur quod illi gradus non haberent aliunde diversitatem, sed ex se ipsis, nisi quod finaliter possemus recurrere ad priumum principium omnium diversitatum et ydemptitatum, quod est ipse Deus, quoniam Deus omnia diversa preterita aut diversa futura aut diversa possibilia, que numquam erunt, intelligit distincte. Et omnia que fiunt per voluntatem Dei et intellectum fiunt, ideo quecumque Deus intelligit sic distincte, possibile est quod hoc fiat idem illi, sive in eodem subiecto sive ab eodem agente, sive in eodem tempore; et omne illud quod Deus intelligit idem sibi, impossibile est quod diversum fiat a se." fols. $146^{vb}$-$147^{ra}$.

# Robert Boyle's Critique of Aristotle in *The Origin of Forms and Qualities*[1]

*Anita Guerrini*

Until fairly recently, it would have seemed paradoxical, if not willfully ignorant, to couple Aristotle and Boyle in a paper. Marie Boas Hall characterized the motivating principle of seventeenth-century chemistry as "militant anti-Aristotelianism." Aristotelianism, Hall argued, was a "spent force" by the middle of the seventeenth century, and few natural philosophers even bothered to refute its doctrines.[2] Since Hall wrote those words nearly forty years ago, the study of post-medieval Aristotelianism has revealed unexpected longevity for at least some of its doctrines, and has led to the recognition that Aristotelianism, like the mechanical philosophy, was a term that encompassed a number of ideas. By the seventeenth century, "Aristotelianism" covered quite a lot of ground.[3]

Matter theory before Boyle's time retained several Aristotelian premises, including the unity of matter, the plenum, the analogy between the microcosm and macrocosm, and the small number of elements. Alchemical practice too retained a core of Aristotelian premises about the nature of matter and combination. In the early seventeenth century, those who attempted to establish chemistry as an art distinct from alchemy did so on the basis of Aristotle's matter theory. These attempts ranged from the didactic methodizing of Libavius to the atomism of Sennert.[4]

In his 1666 treatise *The Origin of Forms and Qualities*, Robert Boyle professed as his goal the elimination of Aristotelian concepts from matter theory and the practice of chemistry and their replacement by the mechanical philosophy. In this paper, I argue that this task proved to be more difficult than Boyle had envisaged. Aristotelianism proved to be a remarkably resilient body of doctrine. In addition, Boyle's religious and philosophical commitments made it impossible for him to describe a wholly mechanistic universe. This is particu-

1. I am grateful to the Beckman Center for the History of Chemistry (now the Chemical Heritage Foundation) for a travel grant, to Antonio Clericuzio and Michael Osborne for their comments, and to Lisa Jardine, William Newman, Lawrence Principe, Jeffrey Burton Russell, and an anonymous referee for references.

2. Boas, *Robert Boyle*, pp. 76, 80-82.
3. Grant, "Ways to Interpret"; Schmitt, "Toward a Reassessment."
4. See Hannaway, *The Chemists*.

larly evident in his discussion of living phenomena, where mechanical causation takes second place to immaterial organizing principles.

I will begin with a discussion of Boyle's theory of matter within his natural philosophical program. Next, I will outline his specific criticisms of Aristotle in *The Origin of Forms and Qualities*. Finally, I will discuss some of the problems with Boyle's critique, employing the particular case of living beings. I will conclude with some observations on the influence of Boyle's ideas on his successors.

## Boyle's Theory of Matter

As in the time of Aristotle, theories of matter proliferated in the course of the seventeenth century and included variations on Paracelsus, Descartes, van Helmont, and the ancient atomists, as well as Aristotelian ideas. Late medieval and Renaissance discussions of "mixtion" — for example, the creation of alloys — were based not on ancient atomism but on Aristotle's *De generatione et corruptione*. Treatment of this topic, from Albertus Magnus to Boyle himself, continued to focus on the supposed site of the form either in the components of the mixt or in the mixt itself. The paper of Jürgen Sarnowsky in this volume illustrates aspects of this discussion in the late Middle Ages. The appearance of various atomistic theories of matter in the later sixteenth and early seventeenth centuries added little new to this debate.[5]

The connections, however, between all these theories and the practice of chemistry remained problematic. Textbooks took a variety of theoretical stances, while retaining as their basis the demonstration of the same standard operations.[6] In the 1650s and 60s, Robert Boyle set as one of his tasks the definitive unification of matter theory and chemistry by subsuming the practice of chemistry under natural philosophy. This is not to be confused with what we would call physics, since "natural philosophy" connoted a much broader set of practices than modern physics.[7] Therefore, as Antonio Clericuzio has pointed out, to label Boyle's program as "reductionist" is misleading.[8] Boyle did not wish to "reduce" chemistry to physics; if anything, he wished to "reduce" natural philosophy to chemistry. Like Aristotle — and indeed, like Newton — Boyle recognized that matter theory should properly be considered the basis of all natural philosophical discourse. He further argued that the practice of chemistry could provide experimental demonstration of the theory of matter, thus linking his work to the broader programmatic goals of seventeenth-century natural

5. Emerton, *The Scientific Reinterpretation*, pp. 48-125; Meinel, "Early Seventeenth-Century Atomism."
6. See Christie e.a., "The Spreading of the Word"; Guerrini, "Chemistry Teaching."
7. Schaffer, "Natural Philosophy."
8. Clericuzio, "A Redefinition."

philosophy, particularly as practiced in England.[9] In Marie Boas Hall's rather positivistic characterization, Boyle wished to rescue chemistry from both the esoteric theories of alchemy and atheoretical, practical pharmacy.[10]

To this end, Boyle endeavored to reinterpret both chemical practice and matter theory in terms of what he called "corpuscularian" doctrines. He distanced his "corpuscularianism" from classical atomism by employing the concept of *minima* prominent in medieval discussions of matter. Unlike atoms, *minima* were further divisible. To Aristotle and his scholastic commentators, *minima* were also the bearers of the form. Boyle's "corpuscularian" or "particularian" doctrines borrowed both from these ideas and from Epicurean atomism as interpreted by Pierre Gassendi.[11] Boyle made the additional provision that motion was not an inherent quality of what he called the *prima naturalia* but was specifically endowed by God.[12] The mechanical attributes of matter — size and shape — were therefore necessary, but not sufficient, causes of chemical change.

Boyle established a procedure of chemical analysis which, unlike that of his predecessors in chemistry, emphasized discrete substances and measured quantities.[13] But in interpreting Boyle's concept of "substance," a problem of translation arises. How does his use of the term "substance," as well as of such commonplace Aristotelian terms as "form," "quality," "generation," "corruption," "alteration," and "accident" differ from that of his predecessors? He may have intended that these terms be interpreted differently, but his failure to invent a new vocabulary reveals the extent to which peripatetic thought continued to form the boundaries for early modern natural philosophy. In *The Sceptical Chemist*, Boyle went to great lengths to demolish the conventional notion of element as embodied in the Aristotelian four elements or the Paracelsian-Spagyrick *tria prima* (or sometimes five). Boyle did not deny that elements, which he defined as "certain primitive and simple, or perfectly unmingled bodies" existed, but he argued that the substances commonly called elements are not part of all mixed bodies but are simply "component parts of the universe."[14]

Like Aristotle, Boyle believed in the essential unity of matter. The world was composed of "one Catholick or universal matter," defined as "a substance extended, divisible, and impenetrable." If we may, for the moment, disregard the evident contradiction between "divisible" and "impenetrable," this matter, Boyle added, was particulate. All matter was divided into "primitive fragments"

9. On the goals of natural philosophy, see Shapin e.a., *Leviathan and the Air-Pump*; Shapin, *The Scientific Revolution*; Dear, "Miracles."
10. Boas, *Robert Boyle*, pp. 48-51; see also Newman, "The Alchemical Sources."
11. On Gassendi's matter theory, see Joy, *Gassendi*; Osler, *Divine Will*, ch. 8.
12. Clericuzio, "A Redefinition," pp. 571-573; Emerton, *Reinterpretation of Form*, pp. 106-112; see also Smith, "Review of Emerton"; Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 15.
13. Boas, *Robert Boyle*, pp. 205-228.
14. Robert Boyle, *The Sceptical Chymist* (Moelwyn-Hughes), p. 187.

of differing sizes and shapes. Starting with these "primary corpuscles" or *prima naturalia*, Boyle described a hierarchy of invisible corpuscular structures that ended in visible bodies. The *prima naturalia* combined into what we might call molecules, or what Boyle called *minima naturalia*, defined as "such little primary concretions or masses as were not easily dissipable into such particles as composed them."[15] This included such "elemental" substances as gold and other metals.

Boyle's agents of change in this system are, as noted above, few: particles are endowed with the "inseparable accidents" of size and shape, and are in addition in motion or at rest. The "texture" of a body, which constitutes its visible identity for Boyle, is owed entirely to "the mechanical affections of the particular corpuscles or other parts, that compose it."[16] Nonetheless, Boyle carefully maintained a distinction between his "corpuscular" doctrines and strictly mechanical explanation, which, he believed, did not allow for the action of God in the universe.[17]

Given the idea of corpuscles, Boyle recognized that the explanation of qualities, whether visible or occult, must be a central concern to his new chemistry. How do bodies act upon each other, and upon our senses? How could one explain color, texture, and shape in terms of moving particles? And what happened when these qualities changed, either by nature or by art? Alchemical theory stated that by changing the qualities of a material one changed its form, that is, its visible identity. Several historians have pointed out that the origin of this assumption lay in Aristotle's theory of matter and his distinction in *De generatione et corruptione* between "alteration" and "generation and corruption," a distinction Boyle retained.[18] In Aristotelian terms, Boyle viewed alchemical change — that is, transmutation — as a form of alteration, in which the substratum of passive matter remained the same, but its properties or attributes changed.[19] As B. J. T. Dobbs noted, the mechanical philosophy did not challenge the central alchemical assumption that transmutation could occur; it only challenged the details of its explanation. Boyle, and later Newton, easily reconciled these two apparently opposed systems of thought.[20]

In *The Origin of Forms and Qualities*, Boyle attempted to explain qualities according to his corpuscularian principles, in the process refuting both Paracelsian chemistry and, particularly, Aristotelian matter theory. Boyle felt that Aristotle's theory of matter still underlay all contemporary thought. He

15. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 29-30; idem, *The Sceptical Chymist* (Moelwyn-Hughes), p. 31.
16. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 45.
17. Cf. Chalmers, "The Lack of Excellency," who argues that Boyle's "corpuscular hypothesis" was wholly mechanical.
18. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 31-32.
19. Aristoteles, *De generatione et corruptione*, 319b.
20. Dobbs, *The Foundations*, ch. 6.

declared that in his book, the ideas about matter "which the schools had interwoven with *Aristotle's* doctrine, [will be] reconciled and accommodated to the notions of corpuscular physics."[21]

But how did Boyle define "Aristotle's doctrine"? By the seventeenth century, "Aristotelianism" embraced a wide range of views, not all of them compatible either with each other or with the works of the Philosopher himself. We may then ask which Aristotle, and which Aristotelian doctrines, formed Boyle's targets. In *The Origin of Forms and Qualities*, Boyle identified Aristotle mainly with scholastic and non-corpuscularian doctrines. He cited several scholastic authors, particularly sixteenth- and seventeenth- century commentators, but seldom Aristotle himself. Authors cited included the Jesuits Francisco Suarez, Rodrigo Arriaga, and Caspar Hurtado, while on forms he juxtaposed J. C. Scaliger, Thomas Aquinas, and Daniel Sennert. Anthony Grafton has argued that the revival of the traditional forms of Aristotelian commentary at the end of the sixteenth century reflected the renewal of debate between Catholics and Protestants; by this argument, Boyle's entry into these debates is not surprising.[22] Boyle's "Aristotelianism" was remarkably restricted; in a work on qualities, he only once cited *De generatione et corruptione*, and he complained that Aristotle gave no account of qualities in the *Physics*. Like most of his contemporaries, Boyle read Aristotle in Latin, but we do not know which translations or editions he read. Scholastic commentaries such as those he cited were common to both Catholic and Protestant universities, where the curricula continued to be scholastic in format.[23] Boyle was not university educated. While his formal education consisted of four years at Eton in the 1630s, he also studied under a tutor for several more years. A surviving notebook from the early 1640s shows that Boyle's early education in natural philosophy was heavily Scholastic and Aristotelian.[24] But he lived in Oxford in the 1650s, in the midst of debates over curriculum reform and the university's role, and his anti-scholastic comments should be seen in this context. Boyle distinguished between Aristotle, whose biological works he claimed to admire, and his "scholastic interpreters," the latter of whom, he argued, still dominated the academies.[25]

In *The Origin of Forms and Qualities*, Boyle professed to follow a Baconian program of collecting particular instances without attempting to form a

21. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 5.
22. Schmitt e.a. (eds.), *Cambridge History of Renaissance Philosophy*, p. 775; see also Hunter e.a., "The Making," pp. 244-245.
23. Schmitt e.a. (eds.), *Cambridge History of Renaissance Philosophy*, pp. 777-778; Costello, *The Scholastic Curriculum*, pp. 64, n. 183. On the availability of texts of Aristotle, see Schmitt, "William Harvey."
24. Sargent, *The Diffident Naturalist*, ch. 1; Principe, "Newly Discovered Boyle Documents," pp. 62-63.
25. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 5-9. On universities, see Debus, *Science and Education*; Kearney, *Scholars and Gentlemen*; Webster, *The Great Instauration*.

general system of thought. "I mean [to compose]," he wrote, "a real, useful, and experimental physiology, established and bottomed upon easy, true and generally received principles."[26] The concept of "generally received" is important, for Boyle wished to distinguish his natural philosophy, with its openness, clarity, and comprehensibility, both from the linguistic obscurity and exclusiveness of scholasticism and from the secrecy of alchemy.[27] Like many Protestant theologians, he argued that interpretation and commentary should not obscure the truth; and like Bacon, he emphasized the methodological importance of Ockham's razor. Moreover, as I shall argue further below, the idea that truth is somehow socially determined was linked to his ideas on the value of experiment and public demonstration.

In *The Origin of Forms and Qualities*, he contrasted books of "general principles," such as Gassendi's *Syntagma* and Descartes's *Principia philosophiae* to Aristotle's (or more accurately, Aristotelian) works, which he claimed failed on grounds both of method, being insufficiently empirical, and of clarity. At the same time, he would himself forebear from the use of unproven theories such as the atomic hypothesis, the *horror vacui*, or the Cartesian "third matter." Although Boyle thus shied away from "system-building," his general theory of matter informed his collection of instances. He would, he said, substantiate the doctrines of the new philosophy with "particular experiments."[28]

## Boyle's Criticism of Aristotle

Boyle focused his criticism on the Aristotelian notion of substantial form or "hylomorphism," that each substance was constituted of the substratum and an immaterial "form." According to his corpuscularian doctrines, immaterial causes were insufficient and methodologically unsound explanations for either primary qualities — size, shape, motion — or secondary, sensible qualities. Here Boyle continued the late medieval debate on chemical mixture: how do forms combine in this process? Qualities, Boyle argued, were not somehow inherent in matter, but derived from the "size, shape and motion of the small parts of matter, and the texture that resulted from the manner of their being disposed in any one body." He redefined Aristotelian categories of change, agreeing with the ancient atomists that generation may be defined simply as combination ("convention" or "syncresis"), corruption as separation ("dissolution" or "diacresis"), and alteration as a mere transposition of atoms.[29]

Boyle most directly criticized Aristotle's definition of form and substance. In contrast to Aristotle's definition of form and thus of species, which was based on the ability to gain knowledge of essences, Boyle viewed all perceived qualities as

26. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 2.
27. Golinski, "Robert Boyle"; Sargent, *The Diffident Naturalist*, pp. 25-27.
28. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 7-9.
29. *Ibid.*, p. 31.

purely subjective, and categorized them as "accidents." Boyle used this term in the Aristotelian sense of inessential quality, although he denied that any quality could be distinct from matter. We perceive aggregates of individual qualities; and our perception of such aggregates, Boyle argued, is socially determined. In Aristotelian terms, all knowledge is mere opinion (*doxa*); we cannot obtain objective knowledge of essences (*episteme*) by means of sense experience, because the senses cannot penetrate to the inner, corpuscular structure of matter. Boyle wrote,

> For if in a parcel of matter there happen to be produced (it imports not much how) a concurrence of all those accidents, ... that men by tacit agreement have thought necessary and sufficient to constitute any one determinate species of things corporeal, then we say, that a body belonging to that species, as suppose a stone, or a metal, is generated or produced *de novo*.[30]

To Boyle, then, all change was merely qualititative and never substantial. He once more revealed here that he was concerned less with Aristotle than with his scholastic interpreters. Norma Emerton comments that both Boyle and Bacon "blurred the distinction between the substantial and the accidental form," a distinction, she adds, "more characteristic of the schoolmen than of Aristotle."[31] The Aristotelian categories of change became literally matters of opinion to Boyle: for example, that particular variety of corruption known as putrefaction may to some be ripeness, or perfection, rather than rottenness: "some men, whose appetites are gratified by rotten cheese, think it then not to have degenerated, but to have attained its best taste."[32] In keeping with the general linguistic shift of the seventeenth century from a language of symbols, metaphors and correspondences to a language of "representative signs," Boyle claimed that qualities were simply names, arbitrarily imposed.[33]

In terms of classification, therefore, Boyle denied that any qualities were essential. Thus Boyle's definition of species was much looser than that of Aristotle, and indeed it seems that he denied the reality of species altogether. Such distinctions, he wrote, are "more arbitrary than we are wont to be aware of; for I confess that I have not yet, either in Aristotle or any other writer, met with any genuine and sufficient diagnostic and boundary for the discriminating and limiting the species of things."[34] Phillip Sloan has plausibly suggested that Boyle's ideas may not have had a direct influence on biological classification in his time, although his Baconian *General Heads for the Natural History of a Country* certainly influenced natural history in the field.[35] But this emphasis on the social

30. *Ibid.*, pp. 31-32.
31. Emerton, *The Scientific Reinterpretation*, pp. 74-75.
32. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 34.
33. Foucault, *The Order of Things*.
34. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 49-50.
35. Sloan, "John Locke," pp. 14-21; Robert Boyle, "General Heads," discussed in Guerrini, *Natural History*, pp. 1-2, 4-5.

determination of knowledge is closely tied to Boyle's experimental methods. Steven Shapin and Simon Schaffer have analyzed the means by which Boyle "generated and validated knowledge" in the context of a community of natural philosophers, whose witnessing, real or literary, of an experiment constituted acknowledgment of a "matter of fact," a piece of true knowledge.[36]

Boyle's maneuver, then, simply transferred the site of the production of qualities or "specific forms" from gross matter — what Aristotle defined as "substance," that is, specific objects — to "insensible corpuscles," which took the place of Aristotelian elements as the constituents of gross matter. "The form of a natural body," said Boyle, "[is] but an essential modification, and as it were the stamp of its matter; or such a convention of the bigness, shape, motion (or rest) situation and contexture (together with the thence resulting qualities) of the small parts that compose the body."[37]

Boyle's primary corpuscles as well as the first "elemental" level of their association, the "*minima*," had distinct sizes and shapes. But Boyle did not leave these matters to chance, referring them to the purpose and design of the Deity:

> It is agreeable to our hypothesis to say, that the first and universal, though not the immediate cause of forms, is none other but God, who put matter into motion (which belongs not to its essence) and established the laws of motion amongst bodies.[38]

Matter was initially divided into invisible parts by local, that is, internal motion; and this division gave them their distinct sizes and shapes. Further division was logically possible (as Aristotle recognized) but in fact occurred only "mentally, and by divine omnipotence."[39] Local motion continued to be "the grand agent or efficient among second causes," the crucial factor in all chemical operations. This local motion was directly caused by God, the first cause. Unlike the Cartesian God, who simply gave the world an initial push, Boyle's Creator "did so regulate and guide the motions of the small parts of the universal matter" as to endow it with a teleological order.[40]

Boyle added another condition to his account which removed it yet further from those of the ancient atomists, a condition also dependent on the operation of God in the universe:

> For we must consider each body, not barely as it is in itself, an intire and distinct portion of matter, but as it is a part of the universe, and consequently placed among a great number

36. Shapin, "Pump and Circumstance"; Shapin e.a., *Leviathan and the Air-Pump*; Garber, "Experiment." Shapin's further work on the identity of that community in *A Social History* is outside the scope of this paper.
37. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 47.
38. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 47; see Schaffer, "Godly Men."
39. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 29; Aristoteles, *De generatione et corruptione*, 315b-317a.
40. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 31, 48.

> and variety of other bodies, upon which it may act, and by which it may be acted on in many ways.

The world, he declared, was an automaton (using the Greek): a machine operated by God. He employed the Cartesian clockwork metaphor in two ways: firstly, particular bodies may be thought of as little machines composed of varied parts. Separately, the parts have no function; but together, in the proper arrangement, they compose a working machine. So Boyle's image of corruption was that of a broken watch: if it no longer functioned as a watch, then it was no longer a watch and its specific identity was lost. Boyle did have a definition of species, then, a purely functional one. Secondly, he also used the clockwork metaphor to describe the universe as a whole as an automaton crafted and put into motion by God.[41]

How did Boyle use this idea of interaction, of clockwork, to critique Aristotle's work? Certainly the idea of interaction and cycles was central to the Aristotelian notion of generation and corruption. The essential difference to Boyle was not in the notion of interaction, but in its cause. Although Aristotle in *De generatione et corruptione* twice mentioned "God" as the prime mover, the cause of all motion, this was God as a constrained creator, the platonic demiurge. Boyle's Christian God was not only creator, but all-powerful Providence. To Boyle, the purposefulness of the universe was not merely a consequence of its being but part of the divine plan. James Jacob has argued that Boyle criticized Aristotelianism not only as erroneous with regard to natural philosophy, but as heretical, because it failed to distinguish between "nature" and "providence."[42] Boyle, perhaps disingenuously, disclaimed any involvement in theological dispute in his introduction to *The Origin of Forms and Qualities*: "[my] business in this tract is to discourse of natural things as a naturalist, without invading the province of divines, by intermeddling with supernatural mysteries."[43]

Although Boyle did not engage in debate on specific doctrines of theology, his critique of Aristotle in *The Origin of Forms and Qualities* was not solely on the grounds of competing philosophies of nature: something far more fundamental was at stake. As his self-proclaimed title of "Christian virtuoso" indicates, the defense of Christianity was central to his natural philosophical program.[44] The role of God in Boyle's philosophy removed his matter theory from the realm of mere mechanism. This was especially evident in his discussion of living phenomena, from which the specter of Aristotle was not easily dismissed.

41. *Ibid.*, pp. 20, 32, 48-49.
42. Westfall, *Science and Religion*, pp. 124-127; Jacob, "Boyle's Atomism"; but see the critique of Jacob's interpretation in Hunter e.a., "The Making," pp. 244-251.
43. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 7.
44. Westfall, *Science and Religion*, pp. 40-44.

## Boyle's Discussion of Living Beings

At the outset of *The Origin of Forms and Qualities*, Boyle made two significant disclaimers: substantial forms, the object of his critique, did not include the "reasonable soul"; nor, he added,

> am I willing to treat of the origin of qualities in beasts; partly because I would not be ingaged to examine of what nature their souls are, and partly because it is difficult in most cases (at least for one that is compassionate enough) either to make experiments upon living animals, or to judge what influence their life may have upon the change of qualities produced by such experiments.[45]

With this disclaimer, Boyle distanced himself from contemporary Cartesian thought on the "beast-machine," although his comment on the difficulty of experiment is again disingenuous, since he had often experimented on live animals.[46]

Despite these disclaimers, the very first of Boyle's "considerations and experiments" on the topic of forms and qualities concerned a living phenomenon, the hatching of an egg. How did one get from the "similar substance" of the yolk and white to the diversified substance of the chick?[47] This topic had recently excited great interest among Boyle's contemporaries, while at the same time demonstrating how strongly Aristotelian ideas, often filtered through Galen, still dominated biological and medical thought. Kenelm Digby's Aristotelian treatise on generation appeared in 1644, and he was followed by, among others, William Harvey (1651), Nathaniel Highmore (1651), and Pierre Gassendi (1658). Descartes's work on the formation of the foetus appeared posthumously in 1664. In all of these works, the thesis of epigenesis — Aristotle's position that the foetus develops out of undifferentiated material — was upheld against preformation, the idea that all the elements of the foetus are present in the sperm (or egg) and merely grow.[48]

Boyle cited none of these authors, but began his account with a mention of the observations of "the learned Fabricius ab Aquapendente, and a recenter anatomist," the latter most likely being Harvey. Harvey commenced his *Exercitationes de generatione animalium* with a "history of the hen's egg."[49] Both Fabricius and Harvey, his student, upheld Aristotle's doctrines on generation, including the notion of potentiality and actuality and the relative functions of male and female. Harvey, however, was by no means uncritical of Aristotle, and unlike the Stagirite he asserted the centrality of the blood as the seat of

45. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 12.
46. Guerrini, "The Ethics of Animal Experimentation." On the concept of the "beast-machine," see Cohen-Rosenfield, *From Beast-Machine to Man-Machine.*
47. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 67.
48. For a summary of these works, see Adelmann, *Marcello Malpighi*, vol. 2, pp. 752-816.
49. William Harvey, *On Animal Generation* (Willis), p. 169.

the "living principle."[50] Boyle did not refer to Harvey's specific doctrines, but addressed more general Aristotelian arguments.

With the exception of Harvey, Boyle's contemporaries all attempted to explain foetal development in mechanical terms. Digby, for example, postulated "an orderly succession of mutations" whereby the original homogeneous matter of the egg was, by the outward actions of heat and moisture, transformed into the foetus. Digby carefully distinguished this "transmutation" from a mere coming together of similar parts after the fashion of Anaxagoras.[51]

Similarly, Descartes, not surprisingly, postulated that only mechanical causes operated in foetal development. "All the parts of the body," he commented, "have first been produced from the seed [*semence*]." The two seminal fluids mix together and "serve as a leavening to each other," heating each other by the motion of their particles. He likened the process to brewing or breadmaking.[52] He continued, "if one knew well what all the parts of the seed of some particular species of animal are ... one could deduce from this alone by reasons completely mathematical and certain the entire shape and conformation of each of its members." In other words, the size and shape of the particles, then acted upon by heat, determined the course of development.[53]

As many scholars have shown, Boyle was much less influenced by Cartesian ideas than by the Christianized Epicureanism of Gassendi. With regard to generation, Gassendi had postulated that, at the Creation, God endowed atoms not only with size, shape and motion, but with a "soul" or generative principle, not dissimilar from the Aristotelian soul or organizing principle.[54] Highmore's *History of Generation* resembled Gassendi's account. He explicitly rejected Digby's reliance on what he called "fortune and chance" in favor of a providentially endowed organizing principle, which he referred to as "Material Atomes, animated and directed by a spiritual form."[55]

Boyle combined aspects of all these accounts in his short description of foetal development. On one level, he was purely mechanical: a "new and various contrivance of the small parts" was sufficient, he said, to affect a change in all three levels of perceived qualities (following Aristotle's classification in *De*

50. Harvey, *On Generation*, p. 391.
51. Kenelm Digby, *Two Treatises* (Paris, 1644), pp. 215-219. See discussion in Adelmann, *Marcello Malpighi*, vol. 2, pp. 769-774.
52. Renatus Descartes, *Description du corps humain* (Adam e.a.), pp. 252-253. My translation.
53. Renatus Descartes, *Description du corps humain* (Adam e.a.), p. 277; also cited in Adelmann, *Marcello Malpighi*, vol. 2, p. 776, in slightly different translation.
54. Osler, *Divine Will*, pp. 60-66; Adelmann, *Marcello Malpighi*, vol. 2, p. 777; relevant passages from Gassendi's *De plantis* and *De generatione animalium* are translated on pp. 798-816. See also Clericuzio, "A Redefinition," pp. 571-573; Grene, *A Portrait*, pp. 99-103.
55. Nathaniel Highmore, *The History of Generation* (1651), pp. 27-28, discussed in Adelmann, *Marcello Malpighi*, vol. 2, pp. 777-779. See also the discussion in Frank, *Harvey*, pp. 100-101.

*Anima* of the levels of sensation) — primary, "commonsensibles," and what Boyle labeled "occult properties" such as medicinal effects.[56]

However, Boyle carefully distanced his account from those of Descartes and other mechanists, noting that

> the chick with all its parts is not a mechanically contrived engine, but fashioned out of matter by the soul of the bird ... which by its plastick power fashions the obsequious matter, and becomes the architect of its own mansion. ... For let the plastick principle be what it will, yet still, being a physical agent, it must act after a physical manner.[57]

This concept of "plastick power" requires some explanation. Antonio Clericuzio has argued that Boyle's theory of matter included the non-mechanical notion of "seminal principles." Boyle defined the *minima naturalia*, that is, the primary concretions of the primary particles, as the "seeds or immediate principles of many sorts of natural bodies."[58] Clericuzio interprets this "seminal principle" as a non-mechanical bearer of qualities, the Paracelsian/Helmontian notion of *semina rerum* in which some particles were endowed with particular powers of organizing other matter. Boyle elsewhere referred to "seminal Faculties or Properties." Like most chemical authors of the time, he referred in this context to the formation of metals in the earth, going back to Aristotle's account in the *Meteorologica*.[59]

However, in the notion of "plastick power" Boyle also distinguished his ideas from those of other chemists. He wished to establish the direct and active role of God and God's design in generation; as such, he aimed, like Gassendi, particularly to refute the Epicurean notion that seminal atoms or principles acted spontaneously, without divine direction and planning. God, he argued, not only endowed particles with a seminal power at Creation, but continued to direct the operation of that power in a purposeful way. Mechanical causes were secondary causes; the primary cause was God, although Boyle professed ignorance as to the specific manner of his action.[60]

## Conclusion

Boyle's critique of Aristotle and Aristotelianism, therefore, was not merely that of a mechanist. It was far more complex. On the topic of generation, we may indeed regard it as a dialogue rather than a critique. Aristotelian explanations of life, particularly in Galenic guise, continued to be the basis of discussion throughout the seventeenth century, and I have given only a small example

56. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 68; on the levels of sensation, see Lloyd, *Aristotle*, pp. 193-194.
57. Robert Boyle, *The Origin of Forms and Qualities* (1666), p. 68.
58. *Ibid.*, p. 30.
59. Clericuzio, "A Redefinition," pp. 583-584, citing Robert Boyle, *Some Considerations* (1663), p. 37. For a somewhat different interpretation, see Henry, "Occult Qualities."
60. Robert Boyle, *The Origin of Forms and Qualities* (1666), pp. 48-49; Osler, *Divine Will*, pp. 190-192.

here of their pervasiveness. I cannot here detail the contribution of Aristotle's specific ideas on the nature of life and generation from his biological works to the ongoing debate on these topics in the seventeenth century.

Boyle's ideas on matter strongly influenced Newton and the Newtonian chemist-physicians of the early eighteenth century. Newton assumed the idea of passive matter endowed with motion and activity by God, and the notion that the first cause was God, who then acted by mechanical means. Newton based the entire *Principia* on this premise, which he then, acting on the principle of analogy, transferred to the action of submicroscopic particles. Such individuals as John and James Keill, John Freind, and George Cheyne then employed Newton's matter theory to explain both chemical activity and physiological functions. That their program ultimately failed does not minimize Boyle's contribution to the debates on animal function.[61]

61. See Guerrini, *Newtonian matter theory*; idem, "James Keill."

*In the following bibliography and index, ancient and medieval authors are listed by their first names. Post-medieval authors are listed by their last names, as Descartes, Boyle, etc. The medieval names are usually given in Latin, as Aegidius Romanus, rather than one of its vernacular variants Giles of Rome, Giles de Rome, or Aegidius von Rom. The footnotes have not been indexed, with the exception for manuscripts, that are listed in a separate index.*

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